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The Common Curriculum Framework

for

K–7 MATHEMATICS

PUBLISHERS DRAFT

Western and Northern Canadian Protocol

JULY 2005

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BACKGROUND

Partner jurisdictions:

Alberta
British Columbia
Manitoba
Northwest Territories
Nunavut
Saskatchewan
Yukon Territory

The Western Canadian Protocol for Collaboration in Basic Education Kindergarten to Grade 12 was signed in December 1993 by the ministers of education from Alberta, British Columbia, Manitoba, Northwest Territories, Saskatchewan and the Yukon Territory. The protocol states that the four western provinces and the two territories agree to collaborate in basic education because of the importance they place on:

- common educational goals
- high standards in education
- removing obstacles for student access to educational opportunities, which includes improving the ease of transfer from jurisdiction to jurisdiction
- optimum use of educational resources.

In February 2000, Nunavut joined the WCP and the name of the protocol was changed to the Western and Northern Canadian Protocol (WNCP).

The Common Curriculum Framework for K–7 Mathematics has been developed by the seven ministries of education in collaboration with teachers, administrators, parents, business representatives, post-secondary educators and others.

The framework identifies beliefs about mathematics, general and specific student outcomes and achievement indicators agreed upon by the seven jurisdictions. Each of the provinces and territories will determine when and how the framework is to be implemented within its own jurisdiction.

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INTRODUCTION

PURPOSE OF THE DOCUMENT

The framework communicates high expectations for students.

This document provides a common base for the curriculum expectations mandated by each province and territory, which will result in consistent student outcomes in mathematics across jurisdictions and enable easier transfer for students moving from one jurisdiction to another. Its intent is to clearly communicate high expectations for students in mathematics education to all education partners across the jurisdictions and facilitate the development of common learning resources.

BELIEFS ABOUT STUDENTS AND MATHEMATICS LEARNING

Students are curious, active learners with individual interests, abilities and needs. They come to classrooms with varying knowledge, life experiences and backgrounds that generate a range of attitudes about mathematics and life.

Students must construct their own meaning of mathematics.

Students learn by attaching meaning to what they do and need to construct their own meaning of mathematics. This meaning is best developed when learners encounter mathematical experiences that proceed from the simple to the complex and from the concrete to the abstract. The use of manipulatives and a variety of pedagogical approaches can address the diversity of learning styles and developmental stages of students, and enhance the formation of sound, transferable, mathematical concepts. At all levels, students benefit from working with appropriate materials, tools and contexts when constructing personal meaning about new mathematical ideas. The learning environment should value and respect each student's way of thinking, so that the learner is comfortable taking intellectual risks, asking questions and posing conjectures.

Mathematics is a human activity, increasing in importance in a rapidly advancing technological society. Greater proficiency in using mathematics increases the opportunities available to individuals. Students need to become mathematically literate in order to explore problem-solving situations, accommodate changing conditions, and actively create new knowledge in striving for self-fulfillment.

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AFFECTIVE DOMAIN

A positive attitude is an important aspect of the affective domain that can have a profound effect on learning. Environments that create a sense of belonging, encourage risk taking and provide opportunities for success help develop and maintain positive attitudes and self-confidence. Students with positive attitudes towards learning mathematics are likely to be motivated and prepared to learn, participate willingly in classroom activities, persist in challenging situations and engage in reflective practices.

To experience success, students must be taught to set achievable goals and assess themselves as they work toward these goals.

Teachers, students and parents need to recognize the relationship between the affective and cognitive domains, and attempt to nurture those aspects of the affective domain that contribute to developing positive attitudes. To experience success, students must be taught to set achievable goals and assess themselves as they work toward these goals.

Striving toward success, and becoming autonomous and responsible learners are ongoing, reflective processes that involve revisiting the setting and assessing of goals.

ABORIGINAL PERSPECTIVES

Aboriginal students in Northern and Western Canada have varied cultural, linguistic backgrounds and come from diverse geographic areas. Students attend schools in a variety of settings from large urban centres to small rural or isolated communities. Because of these diverse backgrounds and settings, teachers need to understand the culture, background and experiences of students.

An understanding of cross-cultural education, applied socio-linguistic first and second language acquisition and standard and non-standard language usage are critical to implementing mathematics curricula appropriately for specific settings. A variety of teaching and assessment strategies are required to build upon the diverse knowledge, cultures, skills, attitudes, experiences and learning styles of students. The strategies used should go beyond the incidental inclusion of topics and objects unique to a culture or region, and must strive to achieve higher levels of multicultural education as described in *Multicultural Education* (Banks and Banks, 1993).

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Key components to implementing mathematics curriculum are contextualization and making connections to the backgrounds and experiences of students. Contextualization refers to the importance of recognizing and building on the mathematical knowledge that students bring with them. Teaching mathematics within contexts and making connections for students can build self-confidence, self-esteem, and increase the willingness to participate and be actively engaged in learning mathematics.

In a classroom environment where learners value and share the gifts and insights of others, students can learn to safely take risks and explore new ideas; mistakes are valued as opportunities for further learning. Mathematical understanding is fostered when students build on their own experiences and prior knowledge and develop personal strategies to solve problems. Learners must realize that it is acceptable to solve complex problems in different ways and that solutions may vary.

Meaningful, effective discussions among students can provide essential links among linguistic, visual, auditory and other representations of mathematics. Oral communication requires sufficient time for reflection and is an important step in clarifying, reinforcing and modifying ideas, attitudes and beliefs about mathematics.

EARLY CHILDHOOD

Young children are naturally curious and develop a variety of mathematical ideas before they enter Kindergarten. Children make sense of their environment through observations and interactions at home, in daycares, preschools and in the community. Mathematics learning is embedded in everyday activities, such as playing, reading, storytelling and helping around the home. Curiosity about mathematics can be stimulated and fostered when children are actively engaged in their environment.

Curiosity about mathematics can be stimulated and fostered when children are actively engaged in their environment.

Active engagement includes activities such as having children compare discrete and continuous quantities, search for patterns, sort objects, put objects in order, create designs, build with blocks and talk about these activities. These activities can contribute to the development of number and spatial sense in children.

Positive early experiences in mathematics create self-confidence, promote risk taking and are as critical to early childhood development as literacy experiences.

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GOALS FOR STUDENTS

The main goals of mathematics education are to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- commit themselves to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society.

Mathematics education must prepare students to use mathematics confidently to solve problems.

At the completion of a mathematics program, students should have developed a positive attitude toward mathematics and have understandings and skills related to Number, Patterns and Relations, Shape and Space, and Statistics and Probability.

It is important for students to develop a positive attitude toward mathematics so they can become confident in their ability to undertake the problems of a changing world, experiencing the power and usefulness of mathematics. Students should also gain an understanding and appreciation of the contributions of mathematics, as a science and an art, to civilization and culture.

Positive attitudes toward mathematics are important.

Students should:

- exhibit a positive attitude toward mathematics
- engage and persevere in mathematical tasks and projects
- contribute to mathematical discussions
- take risks in performing mathematical tasks
- exhibit curiosity
- show enjoyment of mathematical experiences.

All students should receive a level of mathematics education appropriate to their needs and abilities.

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CONCEPTUAL FRAMEWORK FOR K–7 MATHEMATICS

Students of mathematics, regardless of age or experience, often struggle with mathematics in settings that are new to them. The conceptual framework outlined in this section offers a multifaceted view of mathematics, and presents the discipline as skills, procedures and concepts woven together.

The chart below shows how student outcomes, organized by grade and strand, are designed to be influenced by mathematical processes and the nature of mathematics. These components are described more fully in this section.

GRADE / STRAND	K	1	2	3	4	5	6	7
Number								
Patterns and Relations • Patterns • Variables and Equations • Relations and Functions								
Shape and Space • Measurement • 3-D Objects and 2-D Shapes • Transformations								
Statistics and Probability • Data Analysis • Chance and Uncertainty								

GENERAL OUTCOMES, SPECIFIC OUTCOMES AND ACHIEVEMENT INDICATORS to outline knowledge, skills and attitudes about mathematics

NATURE OF MATHEMATICS

change, constancy, dimension (size and scale), number sense, patterns, relationships, spatial sense, uncertainty

MATHEMATICAL PROCESSES— COMMUNICATION, CONNECTIONS, MENTAL MATHEMATICS AND ESTIMATION, PROBLEM SOLVING, REASONING, TECHNOLOGY, VISUALIZATION

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MATHEMATICAL PROCESSES

There are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and to encourage lifelong learning in mathematics.

Students are expected to:

• *Communication*	• communicate mathematically
• *Connections*	• connect mathematical ideas to other concepts in mathematics, to everyday experiences and to other disciplines
• *Mental Mathematics and Estimation*	• use mental mathematics and estimation where appropriate
• *Problem Solving*	• develop and apply new mathematical knowledge through problem solving
• *Reasoning*	• reason and justify their thinking
• *Technology*	• select and use appropriate technologies as tools to solve problems
• *Visualization*	• use visualization to assist in processing information, making connections and solving problems.

The Common Curriculum Framework incorporates these seven interrelated mathematical processes that are intended to permeate teaching and learning along with the use of technology.

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Communication

Communication is important in clarifying, reinforcing and modifying ideas, attitudes and beliefs about mathematics. Students need to communicate mathematical ideas in a variety of ways and contexts.

Communication can help students make connections among concrete, pictorial, symbolic, verbal, written and mental representations of mathematical ideas.

Students must be able to communicate effectively.

Students need opportunities to read about, represent, view, write about, listen to, and discuss mathematical ideas. These opportunities allow students to create links between their own language and ideas, and the formal language and symbols of mathematics.

Connections

Contextualization and making connections to the experiences of learners are powerful processes in developing mathematical understanding. When mathematical ideas are connected to each other and to real world phenomena, students can begin to view mathematics as useful and relevant.

Learning mathematics within contexts and making connections can build self-confidence, and self-esteem, validate past experiences, and increase the willingness to participate and be actively engaged.

Through connections, students should begin to view mathematics as useful and relevant.

The brain is constantly looking for and making connections. "Because the learner is constantly searching for connections on many levels, educators need to orchestrate the experiences from which learners extract understanding… Brain research establishes and confirms that multiple complex and concrete experiences are essential for meaningful learning and teaching." (Caine and Caine, 1991, p. 5)

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Mental Mathematics and Estimation

Number sense is the cornerstone of mental mathematics and estimation.

Mental mathematics is a combination of cognitive strategies that enhances flexible thinking and number sense, and enables students to determine answers without paper and pencil.

Number sense is the cornerstone of mental mathematics and estimation.

Estimation is a strategy for determining approximate values or quantities (usually by referring to benchmarks or using referents) or determining reasonableness of calculated values. Students need to know how, when and what strategy to use when estimating.

The context of a problem helps determine when it is necessary or desirable to have an exact answer or an estimate of that answer.

Estimation skills are essential in order for students to determine the reasonableness of answers generated by technology.

Problem Solving

Problem solving strategies are developed and enhanced by teaching for, about and through problem solving.

Specific outcomes at any point in time may not deal with problem solving. However, the skills, understandings and procedures that are explored may prepare students for future settings that involve problem solving. Learning through problem solving should be the focus of mathematics at all grade levels. When students encounter new situations and respond to questions of the type, "*How would you...?*" or "*How could you...?*" the problem solving approach is being modelled. Students can develop their own problem solving strategies by being open to listening, discussing and trying different strategies.

Learning through problem solving should be the focus of mathematics at all grade levels.

Problem solving is a powerful teaching tool that fosters creative and innovative solutions. Observing problems being solved or modelled empowers students to explore different alternatives. Creating an environment where students openly look for and engage in finding multiple procedures for solving problems builds self-confidence and develops confident cognitive mathematical risk takers.

Students should be confident and flexible problem solvers using a wide range of strategies in their work and accept that problems may have different solutions.

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Reasoning

Reasoning helps students make sense of mathematics and think logically.

Reasoning helps students make sense of mathematics and think logically. Students need to develop confidence in their abilities to reason and justify their mathematical thinking. A teacher can be thought of as a "coach of thinking," where high-order questions are posed in order to challenge students to think and develop a sense of wonder about mathematics. New approaches to reasoning can be explored when students respond to questions like "*What is another way...?*" or "*What strategy works best for you and why?*"

The mathematics classroom provides opportunities for experiencing inductive reasoning. Inductive reasoning occurs when students explore and record results, analyze observations, make generalizations from patterns and test these generalizations. Questions and challenges require students to go beyond what they have done previously and build new connections.

Deductive reasoning occurs when students test conjectures and build arguments that serve to validate thinking, or try to find a counterexample that would prove a stated generalization to be incorrect.

Requisites to foster thinking and reasoning include such factors as a safe environment; wait time from the teacher, an attitude of acceptance toward student errors and efforts, and the promotion of collaborative problem solving. (Fraivillig, April 2001, TCM)

Technology

Technology will free students to test relationships or alternative conjectures and attempt to solve complex problems.

The increased availability of technology in schools can contribute to the teaching of a wide range of learning outcomes. Rather than spending time on tedious calculations, technology can be used to free students to test relationships or alternative conjectures and attempt to solve further problems.

Calculators and computers can be used as tools to:

- explore and demonstrate mathematical relationships and patterns
- organize and display data
- extrapolate and interpolate
- assist with calculation procedures as part of solving problems and promote independence
- decrease the time spent on tedious computations when other mathematical learning is the focus
- reinforce the learning of basic facts and test properties
- develop personal algorithmic procedures for mathematical operations
- create geometric displays
- simulate situations
- create settings that contribute to the development of understanding, number sense and numerical power.

Technology can become part of creating a learning environment in which the growing curiosity of students can lead to rich mathematical discoveries.

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Visualization

Images are useful in describing the physical and mathematical environment.

Visualization involves thinking in pictures and images and the ability to perceive, transform and re-create different aspects of the visual-spatial world. (Armstrong, 1993, p. 10)

Visual images and visual reasoning are important components of number, spatial and measurement sense. This visual knowledge is developed in students as they examine and explore discrete quantities, continuous quantities, 3-D objects and 2-D shapes in hands-on settings.

The ability to visualize as a component of number sense allows students not only to see numbers that are described by numerals in either written or oral form but realize that different representations are possible. This realization that numbers can have multiple interpretations allows numerically powerful students to use a variety of calculation strategies, even when completing calculations involving the same operation. (Charles and Lobato, 1998, NCSM)

Spatial visualization and reasoning enables students to go beyond the discovery and description of relationships among 3-D objects, between 3-D objects and 2-D shapes, and between parts of 3-D objects and 2-D shapes.

Being able to interpret plans, read maps, follow directions and "visualize" objects described verbally are all part of spatial sense and spatial reasoning. Appropriate instruction can develop and improve spatial sense, an important component of mathematics achievement and problem solving. (Del Grande, 1987, p. 14-20)

One aspect of visualizing continuous quantities is the realization that certain characteristics of objects may not be what they appear to be — that our eyes may deceive us. Measurement is required to resolve this type of dilemma. Measurement sense goes beyond the acquisition of specific measurement skills. It includes the ability to decide when to measure, when to estimate and to know several estimation strategies. (Shaw & Puckett Cliatt, 1989)

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NATURE OF MATHEMATICS

- *Change*
- *Constancy*
- *Dimension*
- *Number Sense*
- *Patterns*
- *Relationships*
- *Spatial Sense*
- *Uncertainty*

Mathematics is one way of trying to understand, interpret and describe our world. There are a number of components that define the nature of mathematics and these are woven throughout this document. These components include: change, constancy, dimension (size and scale), number sense, patterns, relationships, spatial sense and uncertainty.

Change

Our understanding of mathematics and the way we do mathematics is continuously changing.

Change is an integral part of mathematics and the learning of mathematics.

Within mathematics, students encounter conditions of change and are required to search for explanations of that change. To make predictions, students need to describe and quantify their observations, look for patterns, and describe those quantities that remain fixed and those that change. For example, the sequence 4, 6, 8, 10, 12, … can be describes as:

- skip counting by 2s, starting from 4
- an arithmetic sequence, with first term 4 and a common difference of 2
- a linear function with a discrete domain.

All three interpretations focus on the changing size of the numbers within the sequence. To be able to understand change, students must become sensitive to patterns such as linear, exponential, logarithmic and periodic. (Steen, 1990, p. 184)

Constancy

Constancy is described by the terms stability, conservation, equilibrium, steady state and symmetry.

Different aspects of constancy are described by the terms stability, conservation, equilibrium, steady state and symmetry. (AAAS–Benchmarks, 1993, p. 270) Many important properties in mathematics and science relate to properties that do not change when outside conditions change. Some examples of constancy that students encounter include:

- the area of a rectangular region is the same regardless of the methods used to determine the solution
- the sum of the interior angles of any triangle is 180°
- the theoretical probability of flipping a coin and getting heads is 0.5.

Some problems in mathematics require students to focus on properties that remain constant. The recognition of constancy enables students to solve problems involving constant rates of change, lines with constant slope, direct variation situations or the angle sums of polygons.

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Dimension (size and scale)

Physical characteristics of objects can be described by attaching numerals and appropriate units to those characteristics (measurement). Dimension and changes in dimensions allow us to examine size and scale relationships between objects and their characteristics such as perimeter, area and volume.

For example:

- knowing dimensions of an object enables a student to communicate about the object and to create representations
- the volume of a rectangular solid can be calculated from given dimensions
- doubling the length of the side of a square increases the area by a factor of four.

Number Sense

An intuition about number is the most important foundation of numerically powerful child.

Number sense, which can be thought of as an intuition about numbers, is the most important foundation of numeracy. (The Primary Program, B.C., 2000, p.146)

Number sense includes such ideas as connecting numerals with situations of life experiences, knowing that numbers have multiple interpretations and understanding that number size is relative. It is an essential requisite for a numerically powerful child who understands how operations are connected to each other and who expects numerical calculations to make sense. (Charles and Lobato, NCSM Monograph, 1998, p. 3)

Howden suggests that number sense develops gradually as a result of exploring numbers in a variety of ways. (Arithmetic Teacher, 1989, p.11)

Van de Walle expresses the view that without a major commitment by a curriculum to experiences that develop number sense, many children will never understand numbers in any other way than counting. (NCTM mathematics for the young child, 1990, p.64)

Greeno sees number sense as part of conceptual understanding of mathematics and states that it is valuable to view number sense as a by-product of learning rather than a product of direct instruction. (JRME, 1991, p.173)

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Patterns

Mathematics is an exploratory science that seeks to understand every kind of pattern.

Patterns exist in number, measurement, geometry, algebra and data.

Students learn to recognize, extend, create and use mathematical patterns. These skills contribute to their interaction with and understanding of their environment.

Relationships

Mathematics is used to describe and explain relationships. As part of the study of mathematics, students look for relationships among numbers, sets, shapes and objects. The search for possible relationships involves the summation and analysis of numerical data, and describing the relationships visually, symbolically, orally or in written form.

Describing relationships is part of the study of mathematics.

For example, the relationship between dimension and volume enables students to determine the effect that changing dimensions has on volume.

Spatial Sense

Spatial sense involves visualization and spatial reasoning.

Spatial sense involves visualization, mental imagery and spatial reasoning. These skills are central to the understanding of mathematics. Spatial sense is developed through various experiences and interactions within the environment, and contributes to the ability to recognize relationships and solve problems.

Some problems involve attaching numerals and appropriate units (measurement) to dimensions of objects. Spatial sense allows students to make predictions about the results of changing these dimensions. For example:

- knowing the dimensions of an object enables a student to communicate about the object and create representations
- the volume of a rectangular solid can be calculated from given dimensions
- doubling the length of the side of a square increases the area by a factor of four.

Exploring geometric properties of objects in the environment leads to an understanding of similarity and congruence, the effects of transformations and the properties that make tessellations possible. The development of spatial sense enables students to carry out complex tasks involving 3-D objects and 2-D shapes in areas such as design, architecture, engineering and computer science. Software programs can contribute to the development of spatial sense.

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Uncertainty

Uncertainty is an inherent part of making predictions.

In mathematics, the interpretations of data and the predictions made from data may lack certainty.

Events and experiments generate statistical data that requires analysis. Students may use technology to summarize and create a visual representation of the data to identify patterns. It is important to recognize that predictions (interpolations and extrapolations) based upon these patterns have a degree of uncertainty.

The quality of the interpretation is directly related to the quality of input data. An awareness of uncertainty allows students to assess the reliability of data and data interpretation.

Chance addresses the predictability of an outcome. As students develop their understanding of probability, the language of mathematics becomes more specific and describes the degree of uncertainty more accurately.

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STRANDS

- *Number*
- *Patterns and Relations*
- *Shape and Space*
- *Statistics and Probability*

The learning outcomes in the Common Curriculum Framework are organized into four strands across the grades. Some of these strands are further subdivided into substrands. There is one general outcome per substrand across the grades.

These strands and substrands follow.

Number
- Develop number sense.

Patterns and Relations

Patterns
- Use patterns to describe the world and solve problems.

Variables and Equations
- Represent algebraic expressions in multiple ways.

Relations and Functions (Grades 10–12 only.)

Shape and Space

Measurement
- Use direct and indirect measure to solve problems.

3-D Objects and 2-D Shapes
- Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

Transformations
- Describe and analyze position and motion.

Statistics and Probability

Data Analysis
- Collect, display and analyze data to solve problems.

Chance and Uncertainty
- Create and solve problems using probability.

OUTCOMES AND ACHIEVEMENT INDICATORS

The Common Curriculum Framework is stated in terms of general outcomes, specific outcomes and achievement indicators.

General outcomes

General outcomes are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades.

Specific outcomes

Specific outcomes are statements that identify the skills, understanding and knowledge students are required to attain by the end of a given grade.

Achievement indictors

Achievement indicators are examples of evidence indicating the degree to which a specific outcome has been attained. The indicators are intended to act as a guide for the scope of the outcome so any number of indicators can be used as evidence of understanding.

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SUMMARY

The conceptual framework for K–7 mathematics describes the nature of mathematics, mathematical processes and organizes the mathematical concepts to be addressed in Kindergarten to Grade 7 mathematics. The components are not meant to stand alone. Activities that take place in the mathematics classroom should stem from a problem-solving approach, be based on mathematical processes and lead students to an understanding of the nature of mathematics through specific knowledge, skills and attitudes related to each strand.

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SUGGESTED TIME ALLOTMENTS

The Common Curriculum Framework is arranged into four strands. Considerable time should be spent on the concepts and processes identified in each strand.

The following should be considered when planning for instruction.

- Integration of the mathematical processes within each strand is encouraged and expected.
- By decreasing emphasis on rote calculation, drill and practice, and the size of numbers used in paper and pencil calculations, more time is available for concept development.
- Problem solving, reasoning and connections are vital to increasing mathematical power and must be integrated throughout the program. A minimum of half the available time within all strands needs to be dedicated to activities related to these processes.
- There is to be a balance between mental mathematics and estimation, paper and pencil exercises, and the appropriate use of technology, including calculators and computers. Concepts should be introduced using manipulatives and gradually developed from the concrete to the pictorial to the symbolic.

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GENERAL AND SPECIFIC OUTCOMES BY STRAND (pages 20-52)

This section presents the general and specific outcomes for each strand, Kindergarten through Grade 7.

GENERAL AND SPECIFIC OUTCOMES WITH ACHIEVEMENT INDICATORS (pages 53-134)

This section presents specific outcomes with corresponding achievement indicators and is organized by strand within each grade. The list of indicators contained in this document is not intended to be exhaustive but rather to provide teachers with examples of evidence of understanding that may be used in determining whether or not students understand a given outcome. Teachers may use any number of these indicators, or may choose to use other indicators as evidence that the desired learning has been achieved. Achievement indicators should also help teachers form a clear picture of the intent and scope of each mathematics outcome.

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GENERAL AND SPECIFIC OUTCOMES (BY STRAND)

Number

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
Specific Outcomes	**Specific Outcomes**	**Specific Outcomes**	**Specific Outcomes**	**Specific Outcomes**
1. Say the number sequence by 1s starting anywhere from 1 to 10 and from 10 to 1. [C, CN] 2. Recognize at a glance and name familiar arrangements of numbers, 1 to 5. [C, CN, ME, V] 3. Relate numerals, 1 to 10, to their respective quantities. [CN, R, V] 4. Represent, concretely and pictorially, a number, 2 to 10, in two parts and name the parts. [C, CN, ME, R, V] 5. Compare quantities, 1 to 10, using one-to-one correspondence. [C, CN, V]	1. Represent and describe numbers to 20, concretely, pictorially and symbolically. [C, CN, V] 2. Demonstrate an understanding of counting by: • indicating that the last number said identifies "how many" • showing that any collection has only one count • using the counting on strategy • using parts or equal groups to count collections. [C, CN, ME, R, V] 3. Recognize at a glance familiar arrangements of numbers up to and including 10. [CN, ME, V]	1. Represent and describe numbers to 100, concretely, pictorially and symbolically. [C, CN, V] 2. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100. [C, CN, R, V] 3. Compare and order numerals up to 100. [C, CN, R, V] 4. Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R] 5. Say the numeral sequence from 0 to 100 by: • 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively • 10s using starting points from 1 to 9 • 2s starting from 1. [C, CN, ME, R]	1. Represent and describe numbers to 1 000 concretely, pictorially and symbolically. [C, CN, V] 2. Illustrate, concretely and pictorially, the meaning of place value for numerals to 1 000. [C, CN, R, V] 3. Compare and order numerals to 1 000. [R, V] 4. Say the numeral sequence forward and backward from 0 to 1 000 by: • 100s, using any starting point • 25s, using starting points that are multiples of 25 • 10s, using any starting point. [C, CN]	1. Represent and describe whole numbers to 10 000, pictorially and symbolically. [C, CN, V] 2. Compare and order numerals to 10 000. [C, CN] 3. Demonstrate an understanding of addition and subtraction of numerals with answers to 10 000 (limited to 3 and 4-digit numerals), by: • using personal strategies for adding and subtracting • estimating sums and differences to predict solutions • solving problems involving addition and subtraction. [C, CN, ME, PS, R]

Number

Grade 5	Grade 6	Grade 7
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
Specific Outcomes 1. Represent and describe whole numbers to 1 000 000. [C, CN, V, T] 2. Apply mental mathematics strategies and number properties to determine answers for basic multiplication facts and related division facts (to 81) such as: • skip counting from a known fact • using doubling or halving • using patterns in the 9s facts • using repeated doubling. [C, CN, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of place value for numbers: • larger than one million • smaller than one thousandth. [C, CN, R, T] 2. Solve problems involving large numbers using technology. [PS, T] 3. Demonstrate an understanding of factors and multiples by: • determining multiples and factors of numbers less than 100 • identifying prime and composite numerals • solving problems involving multiples. [PS, R, V] 4. Relate improper fractions to mixed numbers. [CN, R, V]	**Specific Outcomes** 1. Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10 and why a number cannot be divided by 0. [C, R] 2. Demonstrate an understanding of the addition, subtraction, multiplication and division of decimals (for more than 1-digit divisors or multipliers, the use of technology is expected) to solve problems. [ME, PS, T] 3. Solve problems involving percent. [C, CN, PS, R, T] 4. Demonstrate an understanding of the relationship between repeating decimals and fractions, and terminating decimals and fractions. [C, CN, R, T]

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
	Specific Outcomes 4. Demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with and without singles. [C, R, V] 5. Read and write numerals to 100. [C, CN, R, V] 6. Say the numeral sequence by: • 1s forward and backward between any two given numbers (to 100) • 2s to 20, forward starting at 0 • 5s and 10s to 100, forward starting at 0. [C] 7. Compare sets containing up to 20 elements to solve problems using: • referents • one-to-one comparison. [C, CN, PS, R, V]	**Specific Outcomes** 6. Describe order or position using ordinal numbers (up to tenth). [C, CN, R] 7. Apply mental mathematics strategies to determine basic addition facts and related subtraction facts to 18, such as: • using doubles • making 10 • one more, one less • two more, two less • addition to subtraction. [C, CN, ME, R, V]	**Specific Outcomes** 5. Illustrate and apply mental mathematics strategies for adding two 2-digit numerals, such as: • adding from left to right • taking one addend to the nearest multiple of ten and then compensating • using doubles. [C, ME, PS, R, V] 6. Illustrate and apply mental mathematics strategies for subtracting two 2-digit numerals, such as: • taking the subtrahend to the nearest multiple of ten • thinking of addition • using doubles. [C, ME, PS, R, V] 7. Apply estimation strategies to predict sums and differences of two 2-digit numerals in a problem-solving context. [C, ME, PS, R]	**Specific Outcomes** 4. Explain the properties of 0 and 1 for multiplication and the properties of 1 for division. [C, CN, R] 5. Communicate and apply mental mathematics strategies to determine basic multiplication facts to 9×9, such as: • skip counting from a known fact • using doubling or halving • using doubling or halving and adding or subtracting one more group • using patterns in the 9s facts • using repeated doubling. [C, ME, PS, R]

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Number (continued)

Grade 5	Grade 6	Grade 7
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
Specific Outcomes 3. Apply mental mathematics strategies for multiplication, such as: • annexing zero • halving and doubling • using the distributive property. [C, R] 4. Demonstrate an understanding of multiplication (2-digit by 2-digit), to solve problems. [C, CN, PS, V] 5. Demonstrate, with and without concrete materials, an understanding of division (3-digit by 1-digit) and interpret remainders to solve problems. [C, CN, PS] 6. Use estimation strategies, including: • front-end rounding • compensation • compatible numbers in problem-solving contexts. [C, CN, ME, PS, R]	**Specific Outcomes** 5. Demonstrate an understanding of ratio concretely, pictorially and symbolically. [C, CN, R, V] 6. Demonstrate an understanding of percent concretely, pictorially and symbolically. [C, CN, R] 7. Demonstrate an understanding of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V] 8. Demonstrate an understanding of addition and subtraction of decimals (limited to thousandths). [C, CN, PS, R, V] 9. Demonstrate an understanding of multiplication and division of decimals (1-digit whole number multipliers and divisors). [C, CN, PS, R, V]	**Specific Outcomes** 5. Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely and symbolically. [C, CN, ME, PS, R, V] 6. Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
	Specific Outcomes 8. Identify the numeral, up to 20, that is one more, two more, one less and two less than a given numeral. [C, CN, ME, PS, V] 9. Demonstrate an understanding of addition and subtraction of numerals with answers to 20, concretely, pictorially and symbolically, by: • using familiar and mathematical language to describe additive and subtractive actions from their experience • creating and solving problems in context that involve addition and subtraction • modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically. [C, CN, ME, PS, R, V]	**Specific Outcomes** 8. Demonstrate an understanding of addition and subtraction of numerals with answers to 100 (limited to 1 and 2-digit numerals) by: • using personal strategies for adding and subtracting with and without the support of manipulatives • creating and solving problems that involve addition and subtraction • explaining that the order in which numbers are added does not affect the sum • explaining that the order in which numbers are subtracted affects the difference. [C, CN, ME, PS, R, V] 9. Demonstrate and explain the effect of adding zero to or subtracting zero from any number. [C, R] 10. Estimate quantities to 100 by using referents. [C, ME, PS, R]	**Specific Outcomes** 8. Demonstrate an understanding of addition and subtraction of numerals with answers to 1 000 (limited to 1, 2 and 3-digit numerals), by: • using personal strategies for adding and subtracting with and without the support manipulatives • creating and solving problems in context that involve addition and subtraction of numerals concretely, pictorially and symbolically. [C, CN, ME, PS, R] 9. Estimate quantities less than 1 000 using referents. [ME, PS, R]	**Specific Outcomes** 6. Demonstrate an understanding of multiplication (2 or 3-digit by 1-digit), to solve problems by: • using personal strategies for multiplication with and without concrete materials • using arrays to represent multiplication • connecting concrete representations to symbolic representations • estimating products. [C, CN, ME, PS, R, V] 7. Demonstrate an understanding of division (1-digit divisor and up to 2-digit dividend), to solve problems by: • using personal strategies for dividing with and without concrete materials • estimating quotients • relating division to multiplication. [C, CN, ME, PS, R, V]

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Number (continued)

Grade 5	Grade 6	Grade 7
General Outcome Develop number sense.	**General Outcome** Develop number sense.	
Specific Outcomes 7. Demonstrate an understanding of fractions by using concrete and pictorial representations to: • create sets of equivalent fractions • compare fractions with like and unlike denominators. [C, CN, PS, R, V] 8. Describe and represent decimals (tenths, hundredths and thousandths) concretely, pictorially and symbolically. [C, CN, R, V] 9. Express decimals as fractions (to thousandths). [CN, R, V] 10. Compare and order decimals (to thousandths), by using: • benchmarks • place value • equivalent decimals. [CN, R, V]	**Specific Outcomes** 10. Illustrate and explain the order of operations, excluding exponents, with and without technology (limited to whole numbers). [CN, ME, PS, T]	

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	General Outcome Develop number sense.		**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
	Specific Outcomes 10. Communicate and use mental mathematics strategies (memorization not intended) for the basic addition and subtraction facts to 18, such as: • counting on and counting back • building up and building down to 10 • building on a known double • connecting addition to subtraction. [C, CN, ME, PS, R, V] 11. Estimate quantities to 20 by using referents. [C, ME, PS, R]		**Specific Outcomes** 10. Apply mental mathematics strategies and number properties to determine answers for basic addition facts and related subtraction facts (to 18), such as: • using doubles, doubles plus one, doubles plus two • making 10 • using the commutative property • using the property of zero • thinking addition for subtraction. [C, CN, ME, R, V]	**Specific Outcomes** 8. Demonstrate an understanding of fractions less than or equal to one by using concrete and pictorial representations to: • name and record fractions for the parts of a whole or a set • compare and order unit fractions • order and compare fractions using concrete materials, a number line and benchmarks of 0, $\frac{1}{2}$ and 1 • illustrate and explain that for different wholes, two identical fractions may not represent the same quantity • provide examples of where fractions are used. [C, CN, PS, R, V] 9. Illustrate and explain decimals (tenths and hundredths) concretely, pictorially and symbolically. [C, CN, R, V]

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Number (continued)

Grade 5	Grade 6	Grade 7

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Number (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			General Outcome Develop number sense.	**General Outcome** Develop number sense.
			Specific Outcomes 11. Demonstrate an understanding of multiplication to 5×5 by: • representing and explaining multiplication using equal grouping and arrays • creating and solving problems in context that involve multiplication • modelling multiplication using concrete and visual representations, and recording the process symbolically • relating multiplication to repeated addition. [C, CN, PS, R]	**Specific Outcomes** 10. Express decimals as fractions (to hundredths). [CN, R, V]

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Number (continued)

Grade 5	Grade 6	Grade 7

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			General Outcome Develop number sense.	
			Specific Outcomes 12. Demonstrate an understanding of division (to 5×5) by: • representing and explaining division using equal sharing and equal grouping • creating and solving problems in context that involve equal sharing and equal grouping • modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically • relating division to repeated subtraction. [C, CN, PS, R]	

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Number (continued)

Grade 5	Grade 6	Grade 7

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			General Outcome Develop number sense.	
			Specific Outcomes 13. Demonstrate an understanding of fractions by: • explaining that a fraction represents an equal part of a whole • describing where fractions are used • illustrating and explaining the meaning of numerator and denominator • comparing fractions of the same whole with like denominators. [C, CN, ME, R, V]	

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Patterns and Relations (Patterns)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
General Outcome Use patterns to describe the world and solve problems.	**General Outcome** Use patterns to describe the world and solve problems.	**General Outcome** Use patterns to describe the world and solve problems.	**General Outcome** Use patterns to describe the world and solve problems.	**General Outcome** Use patterns to describe the world and solve problems.
Specific Outcomes 1. Demonstrate an understanding of repeating patterns (two or three elements), by: • identifying • reproducing • extending • creating patterns using manipulatives, sounds and actions. [C, CN, PS, V] 2. Identify repeating patterns in the environment. [C, CN, V]	**Specific Outcomes** 1. Demonstrate an understanding of repeating patterns (two to four elements), using manipulatives, diagrams, sounds and actions, to: • describe • reproduce • extend • create patterns using manipulatives, sounds and actions. [C, PS, R, V] 2. Translate repeating patterns from one representation to another. [C, R, V] 3. Identify and describe repeating patterns in the environment. [C, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of numerical and non-numerical repeating patterns by: • describing • reproducing • extending • creating patterns using manipulatives, diagrams, sounds and actions. [C, CN, PS, R, V] 2. Demonstrate an understanding of numerical and non-numerical increasing patterns by: • describing • reproducing • extending • creating patterns using manipulatives diagrams, sounds and actions (numbers to 100). [C, CN, PS, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of numerical and non-numerical increasing patterns by: • describing • extending • comparing • creating patterns using manipulatives, diagrams, sound and actions. [C, CN, PS, R, V] 2. Demonstrate an understanding of numerical and non-numerical decreasing patterns by: • describing • extending • comparing • and creating patterns using manipulatives, diagrams, sound and actions. [C, CN, PS, R, V]	**Specific Outcomes** 1. Identify and describe patterns found in tables and charts, including a multiplication chart. [C, CN, PS, V] 2. Reproduce a pattern shown in a table or chart using concrete materials. [C, CN, V] 3. Extend patterns found in a table or chart to solve problems. [C, CN, PS, R, V] 4. Identify and explain mathematical relationships using Venn and Carroll diagrams to solve problems. [CN, PS, V, R]

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Patterns and Relations (Patterns)

Grade 5	Grade 6	Grade 7
General Outcome Use patterns to describe the world and solve problems.	**General Outcome** Use patterns to describe the world and solve problems.	**General Outcome** Use patterns to describe the world and solve problems.
Specific Outcomes 1. Determine the pattern rule to make predictions about subsequent elements. [C, CN, PS, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of the relationship within T-tables to solve problems. [C, CN, PS, R] 2. Represent and describe patterns and relationships using graphs and tables. [C, CN, ME, PS, R, V]	**Specific Outcomes** 1. Translate between an oral or written pattern and an equivalent algebraic expression (one-step, first-degree). [C, CN, R] 2. Graph algebraic expressions, analyze the graph and draw conclusions from a pattern to solve problems. [C, CN, R, V]

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Patterns and Relations (Patterns) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		General Outcome Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	
		Specific Outcomes 3. Determine the missing element in a given numerical or non-numerical repeating or increasing pattern. [C, CN, PS, R, V] 4. Identify and describe numerical and non-numerical patterns in the environment. [C, CN, V]	**Specific Outcomes** 3. Determine missing elements in increasing and decreasing patterns. [C, PS, R, V]	

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Patterns and Relations (Patterns) (continued)

Grade 5	Grade 6	Grade 7

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Patterns and Relations (Variables and Equations)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	General Outcome Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.
	Specific Outcomes 4. Describe equality as a balance and inequality as an imbalance, and provide examples (0 to 20). [C, CN, R, V] 5. Record equalities using the equal symbol. [C, CN, PS]	**Specific Outcomes** 5. Demonstrate and explain the meaning of inequality by using manipulatives and diagrams (0 to 100). [C, PS, R, V] 6. Record equalities and inequalities symbolically using the equal symbol or the not equal symbol. [C, CN, PS]	**Specific Outcomes** 4. Solve one-step equations involving symbols representing an unknown number. [C, CN, PS, R, V]	**Specific Outcomes** 5. Translate a given problem into an equation in which a variable is used to represent an unknown number. [CN, R] 6. Solve one-step equations involving a variable to represent an unknown number. [C, CN, PS, R, V]

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Patterns and Relations (Variables and Equations)

Grade 5	Grade 6	Grade 7
General Outcome Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.
Specific Outcomes 2. Solve problems involving single-variable, one-step equations with whole number coefficients and whole number solutions. [C, CN, PS, R]	**Specific Outcomes** 3. Demonstrate and explain the meaning of preservation of equality concretely, and record the process. [C, CN, PS, R, V] 4. Solve problems involving single-variable, one-step equations with whole number coefficients and whole number solutions. [C, CN, PS, R]	**Specific Outcomes** 3. Explain the difference between a mathematical expression and an equation. [CN, PS, V] 4. Evaluate an expression given the value of the variable(s). [CN, R] 5. Model and solve problems that can be represented by one-step linear equations of the form $x + a = b$, concretely, pictorially and symbolically, where a and b are integers. [CN, PS, R, V] 6. Model and solve problems that can be represented by linear equations of the form: • $ax + b = c$ • $ax = b$ • $\frac{x}{a} = b$ concretely, pictorially and symbolically, where a, b and c are positive integers. [CN, PS, R, V]

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Patterns and Relations (Variables and Equations) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

Patterns and Relations (Variables and Equations) (continued)

Grade 5	Grade 6	Grade 7

Shape and Space (Measurement)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.
Specific Outcomes 1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight) and volume (capacity). [CN, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of measurement as a process of comparing by: • identifying attributes that can be compared • ordering objects • making statements of comparison • filling, covering or matching. [C, CN, ME, R, V]	**Specific Outcomes** 1. Relate the number of days to a week and the number of months to a year in a problem-solving context. [C, CN, PS] 2. Relate the size of a unit of measure to the number of units used to measure length and mass (weight). [C, CN, ME, R, V] 3. Compare and order objects by length, height, distance around and mass (weight) using non-standard units, and make statements of comparison. [C, ME, R, V] 4. Measure length to the nearest unit by: • using multiple copies of a unit • using a single copy of a unit (iteration process). [C, R, V]	**Specific Outcomes** 1. Relate the passage of time to common activities using non-standard and standard units (minutes, hours, days, weeks, months and years). [CN, ME, R] 2. Relate the number of seconds to a minute, the number of minutes to an hour and the number of days to a month in a problem-solving context. [C, CN, PS, R, T, V] 3. Demonstrate an understanding of measuring length (cm and m), by: • selecting and justifying referents for the units cm and m • modeling and describing the relationship between the units cm and m • estimating length using referents • measuring and recording length, width and height. [C, CN, ME, PS, R, V]	**Specific Outcomes** 1. Read and write time from digital and analog clocks, including 24-hour clocks. [C, CN, V] 2. Read and write calendar dates in the format yyyy/mm/dd. [C, V] 3. Demonstrate an understanding of area of regular and irregular 2-D shapes by: • recognizing that area is measured in square units • selecting and justifying referents for the units (cm^2 or m^2) • estimating area by using referents for cm^2 or m^2 • determining and recording area (cm^2 or m^2) • constructing different rectangles, for a given area (cm^2 or m^2), to demonstrate that many rectangles are possible. [C, CN, ME, PS, R, V]

Shape and Space (Measurement)

Grade 5	Grade 6	Grade 7
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.
Specific Outcomes 1. Design and construct different rectangles given one or both of perimeter and area (whole numbers), and draw conclusions. [C, CN, PS, R, V] 2. Demonstrate an understanding of measuring length (mm) by: • selecting and justifying referents for the units mm • modelling and describing the relationship between the units mm and cm and between the units mm and m. [C, CN, ME, PS, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of angles by: • identifying examples of angles in the environment • classifying angles according to their measure • estimating the measure of angles using 45°, 90° and 180° as reference angles • determining angle measures in degrees • drawing and labelling angles when the measure is specified. [C, CN, V] 2. Describe measure of angles as: • the measure of a rotation • the measure of an inside corner of a polygon. [C, PS, R] 3. Demonstrate that the sum of interior angles is: • 180° in a triangle • 360° in a quadrilateral. [C, R]	**Specific Outcomes** 1. Demonstrate an understanding of circles by: • describing the relationships among radius, diameter and circumference of circles • relating circumference to pi • determining that the sum of the central angles of a circle is 360° • constructing circles with a given radius or diameter • solving problems involving the radii, diameters and circumferences of circles. [C, CN, R, V] 2. Develop and apply a formula for determining the area of a: • triangle • parallelogram • circle. [CN, PS, R, V]

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Shape and Space (Measurement) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	
		Specific Outcomes 5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes. [C, R, V]	**Specific Outcomes** 4. Demonstrate an understanding of measuring mass (g and kg), by: • selecting and justifying referents for the units g and kg • modelling and describing the relationship between the units g and kg • estimating mass using referents • measuring and recording mass. [C, CN, ME, PS, R, V] 5. Demonstrate an understanding of perimeter of regular and irregular shapes by: • estimating perimeter using referents for centimetre or metre • measuring and recording perimeter (cm and m) • constructing different shapes for a given perimeter (cm and m), to demonstrate that many shapes are possible for a perimeter. [C, ME, PS, R, V]	

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Shape and Space (Measurement) (continued)

Grade 5	Grade 6	Grade 7
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	
Specific Outcomes 3. Demonstrate an understanding of volume by: • recognizing that volume is measured in cubic units • selecting and justifying referents for the units cm^3 or m^3 • estimating volume by using referents for cm^3 or m^3 • measuring and recording volume (cm^3 or m^3) • constructing rectangular prisms for a given volume. [C, CN, ME, PS, R, V] 4. Demonstrate an understanding of capacity by: • recognizing that the litre is the standard unit for measuring capacity • describing the relationship between mL and L • selecting and justifying referents for the units mL or L • estimating capacity by using referents for mL or L • measuring and recording capacity (mL or L). [C, CN, ME, PS, R, V]	**Specific Outcomes** 4. Develop and apply a formula for determining the: • perimeter of polygons • area of rectangles • volume of right rectangular prisms. [C, CN, PS, R, V]	

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Shape and Space (3-D Objects and 2-D Shapes)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
General Outcome Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes 2. Sort 3-D objects using a single attribute. [CN, R, V] 3. Build and describe 3-D objects. [CN, PS, V]	**Specific Outcomes** 2. Sort 3-D objects and 2-D shapes using one attribute, and explain the sorting rule. [C, CN, R, V] 3. Investigate and predict the results of constructing and deconstructing 2-D shapes and 3-D objects, and verify predictions. [C, CN, PS, V] 4. Compare and match 2-D shapes to parts of 3-D objects in the environment. [C, CN, V]	**Specific Outcomes** 6. Sort 2-D shapes and 3-D objects using two attributes, and explain the sorting rule. [C, R, V] 7. Describe, compare, construct and name 3-D objects including: • cubes • spheres • cones • cylinders • pyramids. [C, R, V] 8. Describe, compare, construct and name 2-D shapes including: • triangles • squares • rectangles • circles. [C, R, V] 9. Identify and name 2-D shapes as parts of 3-D objects in the environment. [C, CN, R, V]	**Specific Outcomes** 6. Describe 3-D objects according to the shape of their faces, and the number of edges and vertices. [C, PS, R, V] 7. Sort and name regular and irregular polygons according to the number of sides, including: • triangles • quadrilaterals • pentagons • hexagons • octagons. [C, CN, R, V]	**Specific Outcomes** 4. Describe, name and construct 3-D objects, including: • rectangular prisms • triangular prisms. [C, CN, R, V] 5. Design and construct nets for 3-D objects. [C, CN, PS, V]

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Shape and Space (3-D Objects and 2-D Shapes)

Grade 5	Grade 6	Grade 7
General Outcome Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes 5. Describe and provide examples of edges and faces of 3-D objects, and sides of 2-D shapes that are: • parallel • intersecting • perpendicular • vertical • horizontal. [C, CN, R, T, V] 6. Identify and sort quadrilaterals including: • rectangles • squares • trapezoids • parallelograms • rhombuses according to their attributes. [C, R, V]	**Specific Outcomes** 5. Construct, compare and name triangles including: • scalene • isosceles • equilateral • right • obtuse • acute in different orientations. [C, PS, R, V] 6. Describe and compare the sides and angles of regular and irregular polygons. [C, PS, R, V]	**Specific Outcomes** 3. Perform geometric constructions including: • perpendicular line segments • parallel line segments • perpendicular bisectors • angle bisectors to solve problems. [CN, PS, R, V]

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Shape and Space (Transformations)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
				General Outcome Describe and analyze position and motion.
				Specific Outcomes 6. Demonstrate an understanding of line symmetry by: • identifying symmetrical 2-D shapes • creating symmetrical 2-D shapes • drawing one or more lines of symmetry in a 2-D shape. [C, CN, V]

Shape and Space (Transformations)

Grade 5	Grade 6	Grade 7
General Outcome Describe and analyze position and motion.	**General Outcome** Describe and analyze position and motion.	**General Outcome** Describe and analyze position and motion.
Specific Outcomes 7. Identify and describe a single transformation including a translation, a rotation and a reflection of 2-D shapes. [C, T, V] 8. Perform a single transformation of a 2-D shape, with and without technology, and draw and describe the image. [C, CN, T, V]	**Specific Outcomes** 7. Create a combination of translation(s) rotation(s) and/or reflection(s) of a single 2-D shape, with and without technology, and draw and describe the image. [C, CN, PS, T, V] 8. Create designs resulting from a combination of transformations of 2-D shapes and identify the transformations used. [C, CN, T, V] 9. Identify and plot points in the first quadrant of a Cartesian plane using whole number ordered pairs. [C, CN, V] 10. Perform a single transformation of a 2-D shape in the first quadrant of a Cartesian plane. [CN, PS, T, V]	**Specific Outcomes** 4. Identify and plot points in the four quadrants of a Cartesian plane using integral ordered pairs. [C, CN, V] 5. Describe positional change of points using horizontal and vertical descriptors in relation to a reference point in a Cartesian plane. [C, PS, V]

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Statistics and Probability (Data Analysis)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		General Outcome Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.
		Specific Outcomes 1. Gather and record data about self and others to answer questions. [C, CN, PS, V] 2. Construct and interpret concrete graphs and pictographs to solve problems. [C, CN, PS, R, V]	**Specific Outcomes** 1. Collect first hand data and organize it using: • tally marks • line plots • charts • lists to answer questions. [C, CN, V] 2. Construct, label and interpret bar graphs to solve problems. [PS, R, V]	**Specific Outcomes** 1. Demonstrate an understanding of many-to-one correspondence. [C, R, T, V] 2. Construct and interpret pictographs and bar graphs involving many-to-one correspondence to draw conclusions. [C, PS, R, V]

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Statistics and Probability (Data Analysis)

Grade 5	Grade 6	Grade 7
General Outcome Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.
Specific Outcomes 1. Differentiate between first-hand and second-hand data. [C, R, V] 2. Construct and interpret double bar graphs to draw conclusions. [C, PS, R, T, V]	**Specific Outcomes** 1. Construct, label and interpret line graphs to draw conclusions. [C, CN, PS, R, V] 2. Select, justify and use appropriate methods of collecting data including: • questionnaires • experiments • databases • electronic media. [C, PS, T] 3. Graph collected data and analyze the graph to solve problems. [C, CN, PS]	**Specific Outcomes** 1. Demonstrate an understanding of central tendency and range by: • determining the measures of central tendency (mean, median, mode) and range • determining the most appropriate measures of central tendency to report findings. [C, PS, R, T] 2. Determine the effect on the mean, median and mode when an outlier is included in a data set. [C, CN, PS, R] 3. Construct, label and interpret circle graphs to solve problems. [C, CN, PS. R, T, V]

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Statistics and Probability (Chance and Uncertainty)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

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Statistics and Probability (Chance and Uncertainty)

Grade 5	Grade 6	Grade 7
General Outcome Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	**General Outcome** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	**General Outcome** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.
Specific Outcomes 3. Describe the likelihood of a single outcome occurring using words such as: • impossible • possible • certain. [C, CN, PS, R] 4. Compare the likelihood of two possible outcomes occurring using words such as: • less likely • equally likely • more likely [C, CN, PS, R] 5. Demonstrate that different outcomes may occur when repeating the same probability experiment. [PS, T]	**Specific Outcomes** 4. Demonstrate an understanding of probability by: • identifying all possible outcomes of a probability experiment • differentiating between experimental and theoretical probability • determining the theoretical probability of outcomes in a probability experiment • determining the experimental probability of outcomes in a probability experiment • comparing experimental results with the theoretical probability for an experiment. [C, ME, PS, T]	**Specific Outcomes** 4. Express probabilities as ratios, fractions and percents. [C, CN, R, V] 5. Identify the sample space for a probability experiment involving two independent events. [C, ME, PS] 6. Conduct a probability experiment to compare the theoretical and experimental probability of two independent events. [C, PS, R, T]

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GENERAL AND SPECIFIC OUTCOMES WITH ACHIEVEMENT INDICATORS

Kindergarten **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Say the number sequence by 1s starting anywhere from 1 to 10 and from 10 to 1. [C, CN]	➢ Name the number that comes after a given number name, one to nine. ➢ Name the number that comes before a given number name, two to ten. ➢ Recite number names from a given number name to a stated number name (forward – one to ten, backward – ten to one) using visual aids.
2. Recognize at a glance and name familiar arrangements of numbers, 1 to 5. [C, CN, ME, V]	➢ Look briefly at a familiar arrangement of dots, 1 to 5, and answer the question, "How many do you see"? without counting. ➢ Recognize a dot arrangement on a five frame.
3. Relate numerals, 1 to 10, to their respective quantities. [CN, R, V]	➢ Construct a set of objects for a given quantity. ➢ Name the number for a given a set of objects. ➢ Hold up the appropriate number of fingers for a given numeral. ➢ Match numerals with their pictorial representation.
4. Represent, concretely and pictorially, a number, 2 to 10, in two parts and name the parts. [C, CN, ME, R, V]	➢ Use fingers, counters or other objects to show a number as two parts and name the number of objects in each part. ➢ Draw or use pictures to show a given number as two parts and name the number of objects in each part.
5. Compare quantities, 1 to 10, using one-to-one correspondence. [C, CN, V]	➢ Construct a set to show more than, fewer than, or as many as another set. ➢ Compare two sets through direct comparison and describe using words such as: more, fewer, as many or the same number.

Kindergarten **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of repeating patterns (two or three elements), by: • identifying • reproducing • extending • creating patterns using manipulatives, sounds and actions. [C, CN, PS, V]	➢ Distinguish between repeating patterns and non-repeating sequences by identifying the part that repeats. ➢ Copy a given repeating pattern, e.g., actions, sound, colour, size, shape or orientation, and describe the pattern. ➢ Extend a variety of given repeating patterns to two more repetitions ➢ Create a repeating pattern using manipulatives, musical instruments or actions.
2. Identify repeating patterns in the environment. [C, CN, V]	➢ Identify two different repeating patterns in the classroom, the school and outdoors, e.g., in a familiar song, in a nursery rhyme.

Kindergarten **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight) and volume (capacity). [CN, R, V]	➢ Compare the length (height) of two objects using the words shorter and longer (taller). ➢ Compare the mass (weight) of two objects using the words lighter and heavier. ➢ Compare the volume (capacity) of two objects using the words less and more. ➢ Compare two objects of similar length (height), mass (weight) or volume (capacity) using the words almost the same.

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Kindergarten **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
2. Sort 3-D objects using a single attribute. [CN, R, V]	➢ Sort, using a single attribute, familiar 3-D objects and explain the sorting rule. ➢ Sort a given set of 3-D objects using a single attribute such as size or shape and explain the sorting rule. ➢ Determine the difference between two given pre-sorted sets by explaining a sorting rule used to sort them.
3. Build and describe 3-D objects. [CN, PS, V]	➢ Create a representation of a familiar 3-D object using materials such as modelling clay and building blocks, and compare the representation to the original 3-D object. ➢ Describe 3-D objects using words such as big, little, round, like a box and like a can.

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Grade 1 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Represent and describe numbers to 20, concretely, pictorially and symbolically. [C, CN, V]	➢ Represent numbers up to 20 using a variety of manipulatives including ten frames and base ten materials. ➢ Read number words to 20. ➢ Partition any quantity up to 10 into 2 parts and identify the number of objects in each part. ➢ Illustrate how a number can be modelled by different objects, e.g., ten elephants represents the same number as ten mice. ➢ Place numerals on a number line in relation to 0, 5, 10 and 20.
2. Demonstrate an understanding of counting by: • indicating that the last number said identifies "how many" • showing that any collection has only one count • using the counting on strategy • using parts or equal groups to count collections. [C, CN, ME, R, V]	➢ Use the last number counted in a set to answer the question "How many are in the set"? ➢ Recognize and correct counting errors. ➢ Show that the count of the number of objects does not change regardless of the order in which the objects are counted. ➢ Show that if several objects are counted and then rearranged, the count of the set does not change. ➢ Use recognition of a known quantity and counting on to determine the total number of objects in a set. ➢ Use groupings of 2s, 5s and 10s in order to count larger quantities.
3. Recognize at a glance familiar arrangements of numbers up to and including 10. [CN, ME, V]	➢ Look briefly at a familiar arrangement of dots (including five and ten frame) and answer the question, "How many"? without counting. ➢ Look briefly at a group of objects in a familiar arrangement and identify "How many"? without counting.

Grade 1 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
4. Demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with and without singles. [C, R, V]	➢ Show how 17 counters can be represented in equal groups in different ways, e.g., groups of 2 and one single, groups of 3 and two singles, groups of 4 and one single and groups of 5 and two singles. ➢ Recognize that for a given number of counters, no matter how they are grouped, the total number of counters does not change. ➢ Group a set of given counters into equal groups in more than one way to show that many groupings are possible.
5. Read and write numerals to 100. [C, CN, R, V]	➢ Identify and read numerals used in situations in the home, school, store, e.g., street numbers, phone numbers, numerals on coins and clocks.
6. Say the numeral sequence by: • 1s forward and backward between any two given numbers (to 100) • 2s to 20, forward starting at 0 • 5s and 10s to 100, forward starting at 0. [C]	➢ Recite forward by 1s the number sequence between two given numbers. ➢ Recite backward by 1s the number sequence between two given numbers. ➢ Skip count by 2s to 20 starting at 0. ➢ Skip count by 5s to 100 starting at 0. ➢ Skip count forward by 10s to 100 starting at 0. ➢ Identify and correct errors and omissions in a number sequence.
7. Compare sets containing up to 20 elements to solve problems using: • referents • one-to-one comparison. [C, CN, PS, R, V]	➢ Build equivalent sets that contain up to 20 elements. ➢ Given a set, build another set that has more, fewer or as many elements. ➢ Build several sets of different objects to represent the same number. ➢ Compare two given sets using comparative words such as more, fewer, as many. ➢ Compare a set to a given referent using comparative language. ➢ Solve story problems (pictures and words) that involve the comparison of two quantities.

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Grade 1 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
8. Identify the numeral, up to 20, that is one more, two more, one less and two less than a given numeral. [C, CN, ME, PS, V]	➢ Select from given choices the numeral that is one or two more, and one or two less than a given numeral. ➢ Name the numeral that is one more, two more, one less and two less than a given numeral, up to 20. ➢ Use ten frames to represent numbers that are one more, two more, one less and two less than a given numeral.
9. Demonstrate an understanding of addition and subtraction of numerals with answers to 20, concretely, pictorially and symbolically, by: • using familiar and mathematical language to describe additive and subtractive actions from their experience • creating and solving problems in context that involve addition and subtraction • modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically. [C, CN, ME, PS, R, V]	➢ Act out a given story problem presented orally or through shared reading. ➢ Indicate if the scenario in a story problem represents additive or subtractive action. ➢ Represent the numbers and actions presented in a story problem by using manipulatives, and record them using sketches and/or number sentences. ➢ Create a word problem for addition that connects to student experience and simulate the action with counters. ➢ Create a word problem for subtraction that connects to student experience and simulate the action with counters. ➢ Create a word problem for a given number sentence. ➢ Represent a given story problem pictorially or symbolically to show the additive or subtractive action and solve the problem.
10. Communicate and use mental mathematics strategies (memorization not intended) for the basic addition and subtraction facts to 18, such as: • counting on and counting back • building up and building down to 10 • building on a known double • connecting addition to subtraction. [C, CN, ME, PS, R, V]	➢ [It is not intended that students will recall the basic facts but will become familiar with strategies to mentally determine sums and differences.] ➢ Use and describe a personal strategy for determining a given sum. ➢ Use and describe a personal strategy for determining a given difference.

Grade 1 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
11. Estimate quantities to 20 by using referents. [C, ME, PS, R]	➢ Estimate a quantity by comparing it to a given referent (known quantity) using comparative language. ➢ Estimate a quantity by comparing it to a given referent by completing the statement, "Is close to…" or "Is about…". ➢ Use 5 or 10 as a referent to estimate the quantity of a set. ➢ Use a ten frame as a referent to estimate the quantity of a set. ➢ Select an estimate for a quantity by choosing between at least two possible choices and explain the choice. ➢ Use language of estimation, such as fewer than, more than and about when estimating and recording results.

Grade 1 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of repeating patterns (two to four elements), using manipulatives, diagrams, sounds and actions, to: • describe • reproduce • extend • create patterns using manipulatives, diagrams, sounds and actions. [C, PS, R, V]	➢ Identify and describe a given repeating pattern containing three or more elements in its core, e.g., aab, aab, …. ➢ Identify errors in a given repeating pattern. ➢ Identify the missing element(s) in a given repeating pattern. ➢ Create a repeating pattern using a variety of manipulatives, musical instruments and actions. ➢ Extend a repeating pattern using manipulatives, diagrams, sounds and actions. ➢ Identify the missing element(s) in a given increasing pattern.
2. Translate repeating patterns from one representation to another. [C, R, V]	➢ Represent a given repeating pattern using another format, e.g., actions to sound, colour to shape. ➢ Describe a given repeating pattern using a letter code, e.g., abc, abc.
3. Identify and describe repeating patterns in the environment. [C, CN, V]	➢ Identify and describe a repeating pattern in the environment, e.g., classroom, outdoors, using everyday language. ➢ Identify repeating events, e.g., days of the week, birthdays.

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Grade 1 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
4. Describe equality as a balance and inequality as an imbalance, and provide examples (0 to 20). [C, CN, R, V]	➢ Construct two equal sets and demonstrate their equality using a balance. ➢ Construct two unequal sets and demonstrate their inequality using a balance. ➢ Explain how to determine if two sets are equal or unequal. ➢ Demonstrate that different representations of the same quantity are equal, 0 to 20.
5. Record equalities using the equal symbol. [C, CN, PS]	➢ Explain that an equation represents balance or equality. ➢ Create a concrete and pictorial representation of a given equation. ➢ Write an equation that represents a concrete or pictorial example of equality. ➢ Provide examples of equalities where the given sum or difference is on either the left or right side of the equal symbol (=). ➢ Record different representations of the same quantity as equalities, 0 to 20.

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Grade 1 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of measurement as a process of comparing by: • identifying attributes that can be compared • ordering objects • making statements of comparison • filling, covering or matching. [C, CN, ME, R, V]	➢ Describe a process that could be used to compare two given objects. ➢ Identify common attributes, such as length (height), mass (weight), volume (capacity) and area, that could be used to compare a given set of two objects. ➢ Determine which of two or more given objects is longest/shortest by matching and explain the reasoning. ➢ Determine which of two or more given objects is heaviest/lightest by matching and explain the reasoning. ➢ Determine which of two or more given objects holds the most/least by filling and explain the reasoning. ➢ Determine which of two or more given objects has the greatest/least area by covering and explain the reasoning.

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Grade 1 **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
2. Sort 3-D objects and 2-D shapes using one attribute, and explain the sorting rule. [C, CN, R, V]	➢ Sort a given set of 3-D objects or 2-D shapes using a given sorting rule. ➢ Sort a given set of 3-D objects using a single attribute determined by the student and explain the sorting rule. ➢ Sort a given set of 2-D shapes using a single attribute determined by the student and explain the sorting rule. ➢ Determine the difference between two given pre-sorted sets of 3-D objects or 2-D shapes and explain a possible sorting rule used to sort them.
3. Investigate and predict the results of constructing and deconstructing 2-D shapes and 3-D objects, and verify predictions. [C, CN, PS, V]	➢ Create two different composite 3-D objects from a given set of 3-D objects, and describe how they are the same and how they are different. ➢ Create two different composite 2-D shapes from a given set of 2-D shapes, and describe how they are the same and how they are different. ➢ Deconstruct a composite 3-D object into its 3-D components and describe the components. ➢ Deconstruct a composite 2-D shape into its 2-D components and describe the components. ➢ Predict the 3-D objects used to produce a given composite 3-D object and verify by deconstructing the composite 3-D object. ➢ Predict the 2-D shapes used to produce a given composite 2-D shape and verify by deconstructing the composite 2-D shape.
4. Compare and match 2-D shapes to parts of 3-D objects in the environment. [C, CN, V]	➢ Match a given 2-D shape to a 3-D object, and explain how they are similar and how they are different.

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Grade 2 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Represent and describe numbers to 100, concretely, pictorially and symbolically. [C, CN, V]	➢ Represent a given number using concrete materials, such as ten frames and base ten materials. ➢ Represent a given number using coins (dimes and pennies). ➢ Represent a given number using tallies. ➢ Represent a given number pictorially. ➢ Represent a given number using expressions, e.g., 24 + 6, 15 + 15, 40 – 10. ➢ Read numerals, including number words, to 100. ➢ Write number words to 20.
2. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100. [C, CN, R, V]	➢ Explain, and show with counters, the meaning of each digit for a given 2-digit numeral with both digits the same. E.g., for the numeral 22, the first digit represents two tens (twenty counters) and the second digit represents two ones (two counters). ➢ Count the number of objects in a set using groups of 10. Write the numeral, and identify the counters that represent the tens digit and counters that represent the ones digit. E.g., for the numeral 24, identify two groups of 10 or twenty counters to represent the tens digit, and four groups of one to represent the ones digit. ➢ Count the number of objects in a set, using groups of 10s and 1s, and record the result as a 2-digit numeral under the headings of 10s and 1s. ➢ Read a 2-digit numeral in a least two ways, e.g., 24 as two 10s and four 1s, twenty and four, two groups of ten and four left over, and twenty four. ➢ Illustrate, using ten frames and diagrams, that a numeral consists of a certain number of groups of ten and a certain number of ones. ➢ Illustrate, using proportional base 10 materials, that a numeral consists of a certain number of tens and a certain number of ones, including groupable and non-groupable manipulatives. ➢ Explain why the value of a digit depends on its placement within a numeral.

Grade 2 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
3. Compare and order numerals up to 100. [C, CN, R, V]	➢ Place a given set of numerals in ascending or descending order and verify the result using a hundred chart, number line or by making references to place value. ➢ Identify the member that has been incorrectly placed in an ordered sequence. ➢ Identify missing numerals in parts of a hundred chart. ➢ Identify incorrectly placed numerals in a hundred chart.
4. Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R]	➢ Use concrete materials or pictorial representations to determine if a number is even or odd. ➢ Identify even and odd numerals in a given sequence, such as in a hundred chart. ➢ Sort a given set of numerals into even and odd.
5. Say the numeral sequence from 0 to 100 by: • 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively • 10s using starting points from 1 to 9 • 2s starting from 1. [C, CN, ME, R]	➢ Extend a skip counting sequence by 2s, 5s, 10s, forward and backward. ➢ Skip count by 10s, given any number from 1 to 9 as a starting point. ➢ Identify and correct errors and omissions in a given skip counting sequence. ➢ Count sums of money with nickels to 50¢ and dimes to 100¢.
6. Describe order or position using ordinal numbers (up to tenth). [C, CN, R]	➢ Indicate a position of a specific object in a sequence by using ordinal numbers up to tenth. ➢ Describe the ordinal position of a specific object in a sequence from different starting points.

Grade 2 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
7. Apply mental mathematics strategies to determine basic addition facts and related subtraction facts to 18, such as: • using doubles • making 10 • one more, one less • two more, two less • addition to subtraction. [C, CN, ME, R, V]	➢ Explain the mental mathematics strategy that could be used to determine a basic fact, such as: • doubles, e.g., for 4 + 6, think 5 + 5 • doubles plus one, e.g., for 4 + 5, think 4 + 4 + 1 • doubles take away one, e.g., for 4+ 5, think 5 + 5 – 1 • doubles plus two, e.g., for 4 + 6, think 4 + 4 + 2 • doubles take away two, e.g., for 4 + 6, think 6 + 6 – 2 • making 10, e.g., for 7 + 5, think 7 + 3 + 2 • addition to subtraction, e.g., for 7 – 3, think 3 + ? = 7.
8. Demonstrate an understanding of addition and subtraction of numerals with answers to 100 (limited to 1 and 2-digit numerals) by: • using personal strategies for adding and subtracting with and without the support of manipulatives • creating and solving problems that involve addition and subtraction • explaining that the order in which numbers are added does not affect the sum • explaining that the order in which numbers are subtracted affects the difference. [C, CN, ME, PS, R, V]	➢ Model addition and subtraction using concrete materials or visual representations and record the process symbolically. ➢ Create an addition or a subtraction equation and a story problem for a given solution. ➢ Describe strategies for solving problems involving missing addends. ➢ Match a number sentence to a missing addend problem. ➢ Use concrete objects to show why order does not affect a sum, e.g., the sum of 12 + 13 is equal to the sum of 13 + 12. ➢ Use concrete objects to show why order affects a difference, e.g., the difference of 2 – 3 is not equal to the difference of 3 – 2.
9. Demonstrate and explain the effect of adding zero to or subtracting zero from any number. [C, R]	➢ Use concrete objects to show that adding zero to any number does not change that number. ➢ Use concrete objects to show that subtracting zero to any number does not change that number.
10. Estimate quantities to 100 using referents. [C, ME, PS, R]	➢ Estimate a given quantity by comparing it to a referent (known quantity). ➢ Use 10 as a referent to estimate the number of groups of ten in a given quantity. ➢ Use a ten frame as a referent to estimate the number of groups of ten in a given quantity. ➢ Select an estimate for a given quantity by choosing between at least two possible choices and explain the choice.

Grade 2 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of numerical and non-numerical repeating patterns by: • describing • reproducing • extending • creating patterns using manipulatives, diagrams, sounds and actions. [C, CN, PS, R, V]	➢ Identify and describe numerical and non-numerical repeating patterns. ➢ Identify the core of a repeating numerical pattern. ➢ Describe a repeating numerical pattern using a letter code, e.g., 123, 123, 123. ➢ Represent repeating numerical patterns concretely and pictorially. ➢ Explain the rule used to create a given repeating numerical pattern. ➢ Identify and describe non-numerical repeating patterns. ➢ Identify the core of a repeating non-numerical pattern. ➢ Describe a repeating non-numerical pattern using a letter code, e.g., abc, abc, abc. ➢ Represent repeating non- numerical patterns concretely and pictorially. ➢ Explain the rule used to create a given repeating non-numerical pattern. ➢ Create a repeating non-numerical pattern and explain the pattern rule. ➢ Identify repeating patterns in everyday life. ➢ Represent a given repeating pattern using another format, e.g., numerals to sound, colour to shape. ➢ Determine the missing element in a given numerical or non-numerical repeating pattern. ➢ Solve problems using patterns.

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Grade 2 **Strand:** Patterns and Relations (Patterns) (continued)	**General Outcome:** Use patterns to describe the world and solve problems.
2. Demonstrate an understanding of numerical and non-numerical increasing patterns by: • describing • reproducing • extending • creating patterns using manipulatives, diagrams, sounds and actions (numbers to 100). [C, CN, PS, R, V]	➢ Identify and describe numerical increasing patterns in a variety of contexts, e.g., hundred chart, number line, addition tables, calendar. ➢ Identify and describe non-numerical increasing patterns in a variety of contexts. ➢ Represent increasing numerical patterns concretely and pictorially. ➢ Represent increasing non-numerical patterns concretely and pictorially. ➢ Identify errors in a given increasing pattern. ➢ Explain the rule used to create a given increasing pattern. ➢ Create an increasing pattern and explain the pattern rule. ➢ Identify increasing patterns in everyday life. ➢ Represent a given increasing pattern using another format, e.g., numerals to sound, colour to shape. ➢ Solve a given problem using patterns.
3. Determine the missing element in a given numerical or non-numerical repeating or increasing pattern. [C, CN, PS, R, V]	➢ Identify and apply a pattern rule to determine missing elements in a given concrete, pictorial or symbolic pattern. ➢ Explain the pattern rule used to determine missing elements in a given concrete, pictorial or symbolic pattern. ➢ Orally describe the strategy used to determine missing elements in a given numerical pattern, e.g., hundred chart, calendar, addition tables.
4. Identify and describe numerical and non-numerical patterns in the environment. [C, CN, V]	➢ Identify and describe numerical and non-numerical patterns in the environment, e.g., house/room numbers, flower petals, book pages, calendar, pine cones, leap years.

Grade 2 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
5. Demonstrate and explain the meaning of inequality by using manipulatives and diagrams (0 to 100). [C, PS, R, V]	➢ Construct two unequal sets and demonstrate their inequality using a balance. ➢ Build and draw two unequal sets and explain the reasoning. ➢ Demonstrate how to change two equal sets to create inequality. ➢ Select from a number of sets the one that is unequal and describe how it is unequal.
6. Record equalities and inequalities symbolically using the equal symbol or the not equal symbol. [C, CN, PS]	➢ Determine whether two sides of an equation are equal or not equal ($\neq$). Write the appropriate symbol and justify the answer. ➢ Model equalities using a variety of concrete representations and record the equality. ➢ Model inequalities using a variety of concrete representations and record the inequality. ➢ Provide examples of inequalities to show that the sum or difference can be on either the left or right side of the not equal symbol.

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Grade 2 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Relate the number of days to a week and the number of months to a year in a problem-solving context. [C, CN, PS]	➢ Read dates on a calendar. ➢ Identify the day of the week and the month of the year for a given calendar date. ➢ Communicate that there are seven days in a week and twelve months in a year. ➢ Determine whether a given set of days is more or less than a week. ➢ Identify yesterday's/tomorrow's date. ➢ Identify the month that comes before and the month that comes after a given month. ➢ Solve problems involving time, limited to the number of days in a week and the number of months in a year.
2. Relate the size of a unit of measure to the number of units used to measure length and mass (weight). [C, CN, ME, R, V]	➢ Explain why one of two given units may be a better choice for measuring the length of an object. ➢ Explain why one of two given units may be a better choice for measuring the mass of an object. ➢ Select a unit for measuring the length or mass of an object and explain why it was chosen. ➢ Estimate the number of non-standard units needed for a measurement task. ➢ Explain why the number of units of a measurement will vary depending upon the unit used.
3. Compare and order objects by length, height, distance around and mass (weight) using non-standard units, and make statements of comparison. [C, ME, R, V]	➢ Measure and record the length, height, distance around or mass (weight) of a given object using non-standard units. ➢ Compare and order the measure of two or more objects in ascending or descending order and explain the method of ordering.

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Grade 2 **Strand:** Shape and Space (Measurement) (continued)	**General Outcome:** Use direct or indirect measurement to solve problems.
4. Measure length to the nearest unit by: • using multiple copies of a unit • using a single copy of a unit (iteration process). [C, R, V]	➢ Explain why overlapping or leaving gaps does not result in accurate measures. ➢ Count the number of units required to measure the length of an object using a single or multiple copy of a unit and explain why. ➢ Explain why measurement results are equal when measuring an object using multiple copies of a unit or using a single copy of a unit many times. ➢ Use non-standard units to measure lengths that are not in straight lines.
5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes. [C, R, V]	➢ Measure an object, change the orientation, re-measure and explain why the measure does not change.

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Grade 2 **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
6. Sort 2-D shapes and 3-D objects using two attributes, and explain the sorting rule. [C, R, V]	➢ Determine the differences between two given pre-sorted sets and explain the sorting rule. ➢ Identify and name two common attributes of items within a sorted group. ➢ Sort a given set of 2-D shapes (regular an irregular) according to two attributes and explain the sorting rule. ➢ Sort a given set of 3-D objects according to two attributes and explain the sorting rule.
7. Describe, compare, construct and name 3-D objects including: • cubes • spheres • cones • cylinders • pyramids. [C, R, V]	➢ Sort a given set of 3-D objects and explain the sorting rule. ➢ Identify common attributes of cubes, spheres, cones, cylinders and pyramids from given sets of the same 3-D objects. ➢ Identify 3-D objects with different dimensions. ➢ Identify 3-D objects with different orientations. ➢ Create and describe a representation of a given 3-D object using materials such as modelling clay. ➢ Provide examples of cubes, sphere, cones, cylinders and pyramids found in the environment.

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Grade 2 **Strand:** Shape and Space (3-D Objects and 2-D Shapes) (continued)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.
8. Describe, compare, construct and name 2-D shapes including: • triangles • squares • rectangles • circles. [C, R, V]	➢ Sort a given set of 2-D shapes and explain the sorting rule. ➢ Identify common attributes of triangles, squares, rectangles and circles from given sets of the same 2-D shapes. ➢ Identify 2-D shapes with different dimensions. ➢ Identify 2-D shapes with different orientations. ➢ Sort 2-D shapes into those that can and those that cannot be folded equally. ➢ Create a model to represent a specified 2-D shape. ➢ Create a pictorial representation of a specified 2-D shape.
9. Identify and name 2-D shapes as parts of 3-D objects in the environment. [C, CN, R, V]	➢ Compare and match 2-D shapes, such as triangles, squares, rectangles and circles, to the faces of 3-D objects in the environment. ➢ Name the 2-D faces of a given 3-D object.

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Grade 2 **Strand:** Statistics and Probability (Data Analysis)	**General Outcome:** Collect, display and analyze data to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Gather and record data about self and others to answer questions. [C, CN, PS, V]	➢ Formulate a question that can be answered by gathering information about self and others. ➢ Organize data as it is collected using concrete objects, tallies, checkmarks, charts or lists. ➢ Answer questions using collected data.
2. Construct and interpret concrete graphs and pictographs to solve problems. [C, CN, PS, R, V]	➢ Determine the common attributes of concrete graphs by comparing a given set of pictographs. ➢ Determine the common attributes of pictographs by comparing a given set of pictographs. ➢ Answer questions from a given concrete graph or pictograph. ➢ Create a concrete graph to display a given set of data and draw conclusions. ➢ Create a pictograph (including labelling a title and legend) to represent a given set of data using one-to-one correspondence. ➢ Solve problems by constructing and interpreting a concrete graph or a pictograph.

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Grade 3 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Represent and describe numbers to 1 000 concretely, pictorially and symbolically. [C, CN, V]	➢ Read a given three-digit numeral without using the word "and", e.g., 321 is three hundred twenty one, NOT three hundred twenty AND one. ➢ Read number words to 1 000. ➢ Represent a given numeral as an expression, e.g., 200 + 56 for 256. ➢ Represent a given numeral using manipulatives, such base ten materials. ➢ Represent a given number pictorially. ➢ Write number words for tens to 90. ➢ Write number words for hundreds to 1 000.
2. Illustrate, concretely and pictorially, the meaning of place value for numerals to 1 000. [C, CN, R, V]	➢ Record, in more than one way, the numeral represented by given proportional and non-proportional concrete materials. ➢ Use proportional and non-proportional concrete materials to represent a given numeral in a different ways and explain how they are equivalent, e.g., 351 can be represented as three 100s, five 10s and one 1s, or two 100s, fifteen 10s and one 1s, or three 100s, four 10s and eleven 1s. ➢ Explain, and show with counters, the meaning of each digit for a given 3-digit numeral with all digits the same, e.g., for the numeral 222, the first digit represents two hundreds (two hundred counters) the second digit represents two tens (twenty counters) and the third digit represents two ones (two counters).

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Grade 3 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
3. Compare and order numerals to 1 000. [R, V]	➢ Place a given set of numerals in ascending or descending order and verify the result by using a hundred chart (e.g., one hundred chart, two hundred chart, three hundred chart), a number line or by making references to place value. ➢ Given three different digits, create as many different 3-digit numerals as possible and place them in ascending or descending order. ➢ Identify the numeral that has been incorrectly placed in an ordered sequence. ➢ Identify missing numerals in parts of hundred charts. ➢ Identify incorrectly placed numerals in hundred charts.
4. Say the numeral sequence forward and backward from 0 to 1 000 by: • 100s, using any starting point • 25s, using starting points that are multiples of 25 • 10s, using any starting point. [C, CN]	➢ Extend a skip counting sequence by 10s and 100s, forward and backward, using any starting point. ➢ Extend a skip counting sequence by 25s, forward and backward, starting at a multiple of 25. ➢ Identify and correct errors and omissions in a given skip counting sequence. ➢ Use skip counting to determine the value in cents of a set of 25¢ coins. ➢ Explain the pattern rule for skip counting for a given numeral sequence.
5. Illustrate and apply mental mathematics strategies for adding two 2-digit numerals, such as: • adding from left to right • taking one addend to the nearest multiple of ten and then compensating • using doubles. [C, ME, PS, R, V]	➢ Illustrate and explain a mental mathematics strategy, concretely and pictorially, for adding two given 2-digit numerals. ➢ Explain how to use the "adding from left to right" strategy, e.g., to determine the sum of 23 + 46, think 20 + 40 and 3 + 6. ➢ Explain how to use the "taking one addend to the nearest multiple of ten" strategy, e.g., to determine the sum of 28 + 47, think 30 + 47 – 2 or 50 + 28 – 3. ➢ Explain how to use the "using doubles" strategy, e.g., to determine the sum of 24 + 26, think 25 + 25; to determine the sum of 25 + 26, think 25 + 25 + 1 or doubles plus 1. ➢ Apply a strategy for adding two given 2-digit numerals.

Grade 3 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
6. Illustrate and apply mental mathematics strategies for subtracting two 2-digit numerals, such as: • taking the subtrahend to the nearest multiple of ten • thinking of addition • using doubles. [C, ME, PS, R, V]	➢ Illustrate and explain a mental mathematics strategy, concretely and pictorially, for subtracting two given 2-digit numerals. ➢ Explain how to use the "taking the subtrahend to the nearest multiple of ten" strategy, e.g., to determine the difference of 48 – 19, think 48 – 20 + 1. ➢ Explain how to use the "thinking of addition" strategy, e.g., to determine the difference of 62 – 45, think 45 + 5, then 50 + 12 and then 5 + 12. ➢ Explain how to use the "using doubles" strategy, e.g., to determine the difference of 24 – 12, think 12 + 12. ➢ Apply a strategy for subtracting two given 2-digit numerals.
7. Apply estimation strategies to predict sums and differences of two 2-digit numerals in a problem-solving context. [C, ME, PS, R]	➢ For a given story problem, explain a prediction for the sum of two 2-digit numerals, e.g., to estimate the sum of 43 + 56, use 40 + 50; the sum is close to 90. ➢ For a given story problem, explain a prediction for the difference of two 2-digit numerals, e.g., to estimate the difference of 56 – 23, use 50 – 20; the difference is close to 30.
8. Demonstrate an understanding of addition and subtraction of numerals with answers to 1 000 (limited to 1, 2 and 3-digit numerals), by: • using personal strategies for adding and subtracting with and without the support of manipulatives • creating and solving problems in context that involve addition and subtraction of numerals concretely, pictorially and symbolically. [C, CN, ME, PS, R]	➢ Model addition and subtraction using concrete or visual representations and record the process symbolically. ➢ Create an addition or subtraction story problem for a given solution. ➢ Use a personal strategy for determining the sum of two given numerals, e.g., for 326 + 48, record 300 + 60 + 14. ➢ Use a personal strategy for determining the difference of two given numerals, e.g., for 127 – 38, record 38 + 2 + 80 + 7 or 127 – 20 – 10 – 8.

Grade 3 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
9. Estimate quantities less than 1 000 using referents. [ME, PS, R]	➢ Use 10 as a referent (known quantity) to estimate the number of groups of ten in a given quantity. ➢ Use 100 as a referent to estimate the number of groups of hundred in a given quantity. ➢ Estimate an unknown quantity by comparing it to a referent. ➢ Select an estimate for a quantity by choosing between three possible choices. ➢ Select and justify a referent for determining an estimate for an unknown quantity.
10. Apply mental mathematics strategies and number properties to determine answers for basic addition facts and related subtraction facts (to 18), such as: • using doubles, doubles plus one, doubles plus two • making 10 • using the commutative property • using the property of zero • thinking addition for subtraction. [C, CN, ME, R, V]	➢ Describe a mental mathematics strategy that could be used to determine a given basic fact, such as: • doubles, e.g., for 6 + 8, think 7 + 7 • doubles plus one, e.g., for 6 + 7, think 6 + 6 + 1 • doubles take away one, e.g., for 6 + 7, think 7 + 7 – 1 • doubles plus two, e.g., for 6 + 8, think 6 + 6 + 2 • doubles take away two, e.g., for 6 + 8, think 8 + 8 – 2 • making 10, e.g., for 6 + 8, think 6 + 4 + 4 or 8 + 2 + 4 • commutative property, e.g., for 6 + 8, think 8 + 6 • addition to subtraction, e.g., for 13 – 7, think 7 + ? = 13. ➢ Provide a rule for determining answers for adding and subtracting zero. ➢ Recall basic addition facts and related subtraction facts, to 18, to solve problems.

Grade 3 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
11. Demonstrate an understanding of multiplication to 5×5 by: • representing and explaining multiplication using equal grouping and arrays • creating and solving problems in context that involve multiplication • modelling multiplication using concrete and visual representations, and recording the process symbolically • relating multiplication to repeated addition. [C, CN, PS, R]	➢ (It is not intended that students will recall the basic facts but will become familiar with strategies to mentally determine products.) ➢ Identify events from experience that can be described as multiplication. ➢ Represent a given story problem (orally, shared reading, written) using manipulatives or diagrams and record in an equation. ➢ Represent a given multiplication equation as repeated addition. ➢ Represent repeated addition as multiplication. ➢ Create and illustrate a story problem for a given number sentence, e.g., given 2×3, create and illustrate a story problem. ➢ Represent, concretely or pictorially, equal groups for a given number sentence. ➢ Use an array to represent a given multiplication equation. ➢ Model the commutative property of multiplication using arrays.
12. Demonstrate an understanding of division (to 5×5), by: • representing and explaining division using equal sharing and equal grouping • creating and solving problems in context that involve equal sharing and equal grouping • modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically • relating division to repeated subtraction. [C, CN, PS, R]	➢ Identify events from experience that can be described as equal sharing. ➢ Identify events from experience that can be described as equal grouping. ➢ Illustrate, with counters or a diagram, a given story problem involving equal sharing, presented orally or through shared reading, and solve. ➢ Illustrate, with counters or a diagram, a given story problem involving equal grouping, presented orally or through shared reading, and solve. ➢ Listen to a story problem, represent the numbers using manipulatives or a sketch and record it with an equation. ➢ Create and illustrate, with counters, a story problem for a given number sentence, e.g., given $6 \div 3$, create and illustrate a story problem. ➢ Represent a given division equation as repeated subtraction. ➢ Represent repeated subtraction as division.

Grade 3 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
13. Demonstrate an understanding of fractions by: • explaining that a fraction represents an equal part of a whole • describing where fractions are used • illustrating and explaining the meaning of numerator and denominator • comparing fractions of the same whole with like denominators. [C, CN, ME, R, V]	➢ Identify common characteristics of a given set of fractions. ➢ Describe everyday situations where fractions are used. ➢ Cut, fold or draw a whole into equal parts and demonstrate that they are equal. ➢ Sort diagrams of regions into those that represent equal parts and those that do not. ➢ Name and record the fraction for the shaded and non-shaded parts of a region. ➢ Represent a given fraction concretely or pictorially. ➢ Use models to compare fractions with the same denominator. ➢ Describe the denominator as how many equal parts there are in the whole (what is being counted). ➢ Describe the numerator as how many equal parts are being counted. ➢ Identify the numerator and denominator for a given fraction.

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Grade 3 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of numerical and non-numerical increasing patterns by: • describing • extending • comparing • creating patterns using manipulatives, diagrams, sound and actions. [C, CN, PS, R, V]	➢ Describe increasing patterns by stating a pattern rule that includes the starting point and a description of how the pattern continues. ➢ Identify the pattern rule of a given increasing pattern and extend the pattern for the next three terms. ➢ Identify and explain errors in a given increasing pattern. ➢ Locate and describe various increasing patterns found on a hundred chart, such as horizontal and vertical patterns. ➢ Compare numeric patterns of counting by 2s, 5s, 10s, 25s and 100s. ➢ Create a concrete, pictorial or symbolic increasing pattern when provided with the rule. ➢ Create a concrete, pictorial or symbolic increasing pattern and describe the pattern rule. ➢ Solve a given problem using increasing patterns. ➢ Identify and describe numerical and non-numerical increasing patterns in the environment.

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Grade 3 **Strand:** Patterns and Relations (Patterns) (continued)	**General Outcome:** Use patterns to describe the world and solve problems.
2. Demonstrate an understanding of numerical and non-numerical decreasing patterns by: • describing • extending • comparing • creating patterns using manipulatives, diagrams, sound and actions. [C, CN, PS, R, V]	➢ Describe decreasing patterns by stating a pattern rule that includes the starting point and a description of how the pattern continues. ➢ Identify the pattern rule of a given decreasing pattern and extend the pattern for the next three terms. ➢ Identify and explain errors in a given decreasing pattern. ➢ Locate and describe various decreasing patterns found on a hundred chart, such as horizontal and vertical patterns. ➢ Compare decreasing numeric patterns of counting backward by 2s, 5s, 10s, 25s and 100s. ➢ Create a concrete, pictorial or symbolic decreasing pattern when provided with the rule. ➢ Create a concrete, pictorial or symbolic decreasing pattern and describe the pattern rule. ➢ Solve a given problem using decreasing patterns. ➢ Identify and describe numerical and non-numerical decreasing patterns in the environment.
3. Determine missing elements in increasing and decreasing patterns. [C, PS, R, V]	➢ Identify and apply a pattern rule to determine missing elements for a given pattern. ➢ Describe the strategy used to determine missing elements in a given increasing or decreasing pattern.

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Grade 3 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
4. Solve one-step equations involving symbols representing an unknown number. [C, CN, PS, R, V]	➢ Explain the purpose of the symbol in a given equation with one unknown. ➢ Create an equation with one unknown to represent a given situation. ➢ Create an alternative symbol for the unknown in a given equation. ➢ Explain why two equations in which the unknown is represented by different symbols can be the same. ➢ Solve a given equation with one unknown using manipulatives. ➢ Solve a given equation with one unknown using guess and test.

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Grade 3 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Relate the passage of time to common activities using non-standard and standard units (minutes, hours, days, weeks, months and years). [CN, ME, R]	➢ Select and use a non-standard unit of measure, such as television shows or pendulum swings, to measure the passage of time and explain the choice. ➢ Select activities that can or cannot be accomplished in minutes, hours, days, months and years. ➢ Provide personal referents for minutes and hours.
2. Relate the number of seconds to a minute, the number of minutes to an hour and the number of days to a month in a problem-solving context. [C, CN, PS, R, T, V]	➢ Communicate that there are sixty seconds in a minute. ➢ Communicate that there are sixty minutes in an hour. ➢ Determine the number of days in any given month using a calendar. ➢ Solve problems involving the number of minutes to an hour and the number of days in a month. ➢ Create a calendar including days of the week, dates and personal events.
3. Demonstrate an understanding of measuring length (cm and m), by: • selecting and justifying referents for the units cm and m • modelling and describing the relationship between the units cm and m • estimating length using referents • measuring and recording length, width and height. [C, CN, ME, PS, R, V]	➢ Provide a referent for one centimetre and explain the choice. ➢ Provide a referent for one metre and explain the choice. ➢ Determine which standard unit is represented by a given referent. ➢ Use concrete materials to show that 100 centimetres is equivalent to 1 metre. ➢ Use personal referents to estimate the length of an object. ➢ Determine and record the length, width or height of a given 2-D shape. ➢ Determine and record the length, width or height of a given 3-D object. ➢ Draw a line of a given length with a ruler. ➢ Draw a line of a given length without a ruler. ➢ Identify 3-D objects that are less than, greater than or about 1m in length.

Grade 3 **Strand:** Shape and Space (Measurement) (continued)	**General Outcome:** Use direct or indirect measurement to solve problems.
4. Demonstrate an understanding of measuring mass (g and kg), by: • selecting and justifying referents for the units g and kg • modelling and describing the relationship between the units g and kg • estimating mass using referents • measuring and recording mass. [C, CN, ME, PS, R, V]	➢ Provide a referent for one gram and explain the choice. ➢ Provide a referent for one kilogram and explain the choice. ➢ Determine which standard unit is represented by a given referent. ➢ Show 1 000 grams using a combination of smaller masses and 1 kilogram in balance on a scale, and explain the relationship. ➢ Use personal referents to estimate the mass of a given object. ➢ Determine and record the mass of a given 3-D object. ➢ Use a balance scale to measure and record the mass of everyday objects using the units g and kg. ➢ Provide examples of 3-D objects that have a mass of approximately 1g, 100g and 1kg. ➢ Model that similar objects can have different masses. ➢ Model that changing the shape of an object does not change its mass.
5. Demonstrate an understanding of perimeter of regular and irregular shapes by: • estimating perimeter using referents for centimetre or metre • measuring and recording perimeter (cm and m) • constructing different shapes for a given perimeter (cm and m), to demonstrate that many shapes are possible for a perimeter. [C, ME, PS, R, V]	➢ Describe perimeter as the distance around a closed shape. ➢ Measure and record the perimeter of a regular shape and explain the strategy used. ➢ Measure and record the perimeter of an irregular shape and explain the strategy used. ➢ Construct a shape for a given perimeter. ➢ Demonstrate that many shapes are possible for a given perimeter by constructing or drawing more than one shape for the same given perimeter. ➢ Use personal referents to estimate the perimeter of a given shape (cm and m).

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Grade 3 **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
6. Describe 3-D objects according to the shape of the faces, and the number of edges and vertices. [C, PS, R, V]	➢ Identify the faces, edges and vertices of a given 3-D object including cubes, spheres, cones, cylinders, pyramids and prisms. ➢ Name the faces of a given 3-D object. ➢ Determine the number of faces, edges and vertices on any given 3-D object. ➢ Construct a skeleton of a given 3-D object and describe how the skeleton relates to the 3-D object. ➢ Sort a given set of 3-D objects according to the number of faces, edges or vertices.
7. Sort and name regular and irregular polygons according to the number of sides, including: • triangles • quadrilaterals • pentagons • hexagons • octagons. [C, CN, R, V]	➢ Sort and name a given set of regular and irregular polygons by the number of sides. ➢ Identify regular and irregular polygons with different dimensions. ➢ Identify regular and irregular polygons with different orientations.

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Grade 3 **Strand:** Statistics and Probability (Data Analysis)	**General Outcome:** Collect, display and analyze data to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Collect first-hand data and organize it using: • tally marks • line plots • charts • lists to answer questions. [C, CN, V]	➢ Record the number of objects in a given set using tally marks. ➢ Determine the common attributes of line plots by comparing a given set of line plots. ➢ Organize a given a set of data using tally marks, line plots, charts or lists. ➢ Collect and organize data using tally marks, line plots, charts and lists. ➢ Answer questions from a given line plot, chart or list. ➢ Answer questions using collected data.
2. Construct, label and interpret bar graphs to solve problems. [PS, R, V]	➢ Determine the common attributes, title and axes, of bar graphs by comparing a given set of bar graphs. ➢ Create bar graphs from a given set of data including labelling the title and axes. ➢ Draw conclusions from a given bar graph to solve problems. ➢ Solve problems by constructing and interpreting a bar graph.

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Grade 4 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Represent and describe whole numbers to 10 000, pictorially and symbolically. [C, CN, V]	➢ Read a given four-digit numeral without using the word "and", e.g., 5 321 is five thousand three hundred twenty one, NOT five thousand three hundred twenty AND one. ➢ Write a given numeral using proper spacing without commas, e.g., 4 567. ➢ Write a given numeral, 0 – 10 000, in words. ➢ Represent a given numeral using a place value chart or diagrams. ➢ Describe the meaning of each digit in a given numeral. ➢ Express a given numeral in expanded notation, e.g., 321 = 300 + 20 + 1. ➢ Write the numeral represented by a given expanded notation. ➢ Explain and show, with counters, the meaning of each digit in a given 4-digit numeral with all digits the same, e.g., for the numeral 2 222, the first digit represents two thousands, the second digit two hundreds, the third digit two tens and the fourth digit two ones.
2. Compare and order numerals to 10 000. [C, CN]	➢ Place a given set of numerals, in ascending or descending order and explain the ordering making references to place value. ➢ Create and order three different 4-digit numerals. ➢ Identify the missing numerals in an ordered sequence or partial number line. ➢ Identify incorrectly placed numerals in an ordered sequence or partial number line.

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Grade 4 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
3. Demonstrate an understanding of addition and subtraction of numerals with answers to 10 000 (limited to 3 and 4-digit numerals), by: • using personal strategies for adding and subtracting • estimating sums and differences to predict solutions • solving problems involving addition and subtraction. [C, CN, ME, PS, R]	➢ Explain how to keep track of digits that have the same place value when adding numerals, limited to 3 and 4-digit numerals. ➢ Explain how to keep track of digits that have the same place value when subtracting numerals, limited to 3 and 4-digit numerals. ➢ Solve problems that involve addition and subtraction. ➢ Describe a situation in which an estimate rather than an exact answer is sufficient. ➢ Use different strategies to estimate sums and differences, e.g., front-end estimation and compensation.
4. Explain the properties of 0 and 1 for multiplication and the properties of 1 for division. [C, CN, R]	➢ Communicate the rule for determining the answer when multiplying by one. ➢ Communicate the rule for determining the answer when multiplying by zero. ➢ Communicate the rule for determining the answer when dividing by one.
5. Communicate and apply mental mathematics strategies to determine basic multiplication facts to 9×9, such as: • skip counting from a known fact • using doubling or halving • using doubling or halving and adding or subtracting one more group • using patterns in the 9s facts • using repeated doubling. [C, ME, PS, R]	➢ Provide examples for applying: • doubling, e.g., for 4×3 think $2 \times 3 = 6$, and $4 \times 3 = 6 + 6$ • doubling and adding one more group, e.g., for 3×7 think $2 \times 7 = 14$, and $14 + 7 = 21$ • doubling and adding two more groups, e.g., for 7×6 think $5 \times 6 = 30$, and $30 + 6 + 6 = 42$ • patterns when multiplying by 9, e.g., for 9×6, think $10 \times 6 = 60$, and $60 - 6 = 54$, e.g., for 7×9, think $7 \times 10 = 70$, and $70 - 7 = 63$ • halving, e.g., if 4×6 is equal to 24, then 2×6 is equal to 12.

Grade 4 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
6. Demonstrate an understanding of multiplication (2 or 3-digit by 1-digit), to solve problems by: • using personal strategies for multiplication with and without concrete materials • using arrays to represent multiplication • connecting concrete representations to symbolic representations • estimating products. [C, CN, ME, PS, R, V]	➢ Model a given multiplication problem, e.g., using an array to demonstrate 3×12 or using expanded notation to solve 8×365 as $(8 \times 300) + (8 \times 60) + (8 \times 5)$. ➢ Use concrete materials, such as base ten blocks or their pictorial representations, to represent multiplication and record the process symbolically. ➢ Create and solve a multi-word problem, e.g., 2 or 3-digit by 1-digit. ➢ Estimate a given product using a personal strategy, e.g., 2×243 is about or a little more than 2×200, or about or a little less than 2×250. ➢ Use an array to demonstrate and solve a given multiplication problem. ➢ Use the distributive property to solve and record a given multiplication problem, e.g., $8 \times 365 = (8 \times 300) + (8 \times 60) + (8 \times 5)$.
7. Demonstrate an understanding of division (1-digit divisor and up to 2-digit dividend), to solve problems by: • using personal strategies for dividing with and without concrete materials • estimating quotients • relating division to multiplication. [C, CN, ME, PS, R, V]	➢ (It is not intended that remainders will be expressed as decimal numerals or fraction numerals.) ➢ Use arrays or base ten materials to solve a given division problem without remainders. ➢ Use arrays or base ten materials to solve a given division problem with remainders. ➢ Solve and record a given division problem using a personal strategy. ➢ Create and solve a given word problem for a 1-digit dividend and a 2-digit dividend. ➢ Estimate a given quotient using a personal strategy, e.g., $86 \div 4$ is about $80 \div 4$ or about $80 \div 5$ or…

Grade 4 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
8. Demonstrate an understanding of fractions less than or equal to one by using concrete and pictorial representations to: • name and record fractions for the parts of a whole or a set • compare and order unit fractions • order and compare fractions using concrete materials, a number line and benchmarks of $0, \frac{1}{2}$ and 1 • illustrate and explain that for different wholes, two identical fractions may not represent the same quantity • provide examples of where fractions are used. [C, CN, PS, R, V]	➢ Represent a given fraction using concrete materials. ➢ Identify a fraction from its given concrete representation. ➢ Name and record the shaded and non-shaded parts of a given set. ➢ Name and record the shaded and non-shaded parts of a given whole. ➢ Represent a given fraction pictorially by shading parts of a given set. ➢ Represent a given fraction pictorially by shading parts of a given whole. ➢ Illustrate how the denominators can be used to compare two given unit fractions, with numerator 1. ➢ Order a given set of fractions that have the same numerator. ➢ Identify which of the benchmarks $0, \frac{1}{2}$ or 1 a given fraction is closer to. ➢ Name fractions between two given benchmarks on the number line. ➢ Order a given set of fractions by placing them on a number line with given benchmarks. ➢ Provide examples of when two identical fractions may not represent the same quantity, e.g., half of a large apple is not equivalent to half of a small apple; half of ten cloudberries is not equivalent to half of sixteen cloudberries. ➢ Provide an example of a fraction that represents part of a set and a fraction that represents part of a whole from everyday contexts.
9. Illustrate and explain decimals (tenths and hundredths) concretely, pictorially and symbolically. [C, CN, R, V]	➢ Write the decimal for a given concrete or pictorial representation of part of a set, part of a region or part of a unit of measure. ➢ Use concrete materials or a pictorial representation to illustrate a given decimal. ➢ Explain the meaning of each digit in a given decimal numeral with all digits the same. ➢ Use money values (dimes and pennies), to represent a given decimal. ➢ Use decimals to record a given money value. ➢ Provide examples of everyday contexts in which tenths and hundredths are used. ➢ Illustrate, using manipulatives or pictures, how a given tenth can be expressed as equivalent hundredths, e.g., 0.9 is equivalent to 0.90 or 9 dimes is equivalent to 90 pennies.

Grade 4 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
10. Express decimals as fractions (to hundredths). [CN, R, V]	➢ Write a given decimal in its fractional form. ➢ Write a given fraction with a denominator of 10 or 100 as a decimal. ➢ Name a given pictorial or concrete representation of a decimal numeral as a fraction or a decimal, e.g., 15 shaded squares on a hundred grid can be named as 0.15 or $\frac{15}{100}$. ➢ Write the decimal equivalent for a given fraction, e.g., 0.50 can be expressed as $\frac{1}{2}$. ➢ Write the fraction equivalent for a given decimal.

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Grade 4 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Identify and describe patterns found in tables and charts, including a multiplication chart. [C, CN, PS, V]	➢ Identify and describe a variety of patterns in a multiplication grid. ➢ Determine the missing element(s) in a given table or chart. ➢ Identify the error(s) in a given table or chart. ➢ Describe patterns found in a multiplication table using mathematical expressions, such as $2n$, $5n$ and $10n$. ➢ Describe how the pattern changes from any given frame to the next frame in a given table or chart.
2. Reproduce a pattern shown in a table or chart using concrete materials. [C, CN, V]	➢ Create a concrete representation of a given pattern displayed in a table or chart. ➢ Explain why the same relationship exists between the pattern in a table and its concrete representation.
3. Extend patterns found in a table or chart to solve problems. [C, CN, PS, R, V]	➢ Translate the information provided in a given problem into a table or chart. ➢ Identify and extend the pattern in a table or chart to solve a given problem.
4. Identify and explain mathematical relationships using Venn and Carroll diagrams to solve problems. [CN, PS, V, R]	➢ Complete a Carroll diagram by entering given data into correct squares to solve problems. ➢ Determine where new elements belong in a given Carroll diagram. ➢ Solve a given problem using a Carroll diagram. ➢ Identify the sorting rule in a given Venn diagram. ➢ Describe the relationship shown in a given Venn diagram, when the circles intersect, when one circle is contained in the other, when the circles are separate. ➢ Determine where new elements belong in a given Venn diagram. ➢ Solve a given problem using a Venn diagram .

Grade 4 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
5. Translate a given problem into an equation in which a variable is used to represent an unknown number. [CN, PS, R]	➢ Translate the visual representation of a given equation with one unknown into its symbolic form using a variable for the unknown. ➢ Identify the unknown in a story problem, represent the problem with an equation and solve concretely, pictorially or symbolically. ➢ Create a story problem for a given equation with one unknown.
6. Solve one-step equations involving a variable to represent an unknown number. [C, CN, PS, R, V]	➢ Solve a given one-step equation using manipulatives. ➢ Solve a given one-step equation using guess and test. ➢ Describe orally the meaning of a given one-step equation with one unknown. ➢ Solve a given equation when the unknown is on the left or right side of the equation.

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Grade 4 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Read and write time from digital and analog clocks, including 24-hour clocks. [C, CN, V]	➢ State that there are 24 hours in a day. ➢ Express the time orally and numerically from a 12-hour analog clock. ➢ Express the time orally and numerically from a 24-hour analog clock. ➢ Express the time orally and numerically from a 12-hour digital clock. ➢ Express the time orally and numerically from a 24-hour digital clock. ➢ Orally describe time as minutes to or minutes after the hour. ➢ Explain the meaning of AM and PM, and provide an example of an activity that occurs during the AM and during the PM.
2. Read and write calendar dates in the format yyyy/mm/dd. [C, V]	➢ Write dates using the format yyyy/mm/dd. ➢ Relate dates written in the format yyyy/mm/dd to dates on a calendar.
3. Demonstrate an understanding of area of regular and irregular 2-D shapes by: • recognizing that area is measured in square units • selecting and justifying referents for the units cm^2 or m^2 • estimating area by using referents for cm^2 or m^2 • determining and recording area (cm^2 or m^2) • constructing different rectangles for a given area (cm^2 or m^2), to demonstrate that many rectangles are possible. [C, CN, ME, PS, R, V]	➢ Describe area as the measure of surface, recorded in square units. ➢ Identify and explain why the square is the most efficient unit for measuring area. ➢ Provide a referent for a square centimetre and explain the choice. ➢ Provide a referent for a square metre and explain the choice. ➢ Determine which standard square unit is represented by a given referent. ➢ Use personal referents to estimate the area of a given 2-D shape. ➢ Determine the area of a regular 2-D shape and explain the strategy. ➢ Determine the area of an irregular 2-D shape and explain the strategy. ➢ Construct a rectangle for a given area. ➢ Demonstrate that many rectangles are possible for a given area by constructing or drawing more than one rectangle for the same given area.

Grade 4 **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
4. Describe, name and construct 3-D objects, including: • rectangular prisms • triangular prisms. [C, CN, R, V]	➢ Identify and name common attributes of rectangular prisms from given sets of rectangular prisms. ➢ Identify and name common attributes of triangular prisms from given sets of triangular prisms. ➢ Sort a given set of rectangular and triangular prisms using the shape of the base. ➢ Construct and describe a model of rectangular and triangular prisms using materials such as pattern blocks or modelling clay. ➢ Construct rectangular prisms from their nets. ➢ Construct triangular prisms from their nets. ➢ Identify examples of rectangular and triangular prisms found in the environment.
5. Design and construct nets for 3-D objects. [C, CN, PS, V]	➢ Match a given net to the 3-D object it represents. ➢ Construct nets for given 3-D objects such as cones, cylinders, cubes, rectangular prisms, triangular prisms and pyramids, and test the designs. ➢ Construct 3-D objects from their nets. ➢ Predict 3-D objects that can be created from a given net and verify the prediction.

Grade 4 **Strand:** Shape and Space (Transformations)	**General Outcome:** Describe and analyze position and motion.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
6. Demonstrate an understanding of line symmetry by: • identifying symmetrical 2-D shapes • creating symmetrical 2-D shapes • drawing one or more lines of symmetry in a 2-D shape. [C, CN, V]	➢ Identify the characteristics of symmetrical and non-symmetrical 2-D shapes. ➢ Sort 2-D shapes into symmetrical and non-symmetrical shapes. ➢ Complete a symmetrical 2-D shape given half the shape and its line of symmetry. ➢ Identify lines of symmetry of a given set of 2-D shapes and explain why each shape is symmetrical. ➢ Determine whether or not a given 2-D shape is symmetrical by using a Mira or by folding and superimposing. ➢ Create a symmetrical shape with and without manipulatives. ➢ Provide examples of symmetrical shapes found in the environment and identify the line(s) of symmetry. ➢ Sort a given set of 2-D shapes into those that have no lines of symmetry, one line of symmetry or more than one line of symmetry.

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Grade 4 **Strand:** Statistics and Probability (Data Analysis)	**General Outcome:** Collect, display and analyze data to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of many-to-one correspondence. [C, R, T, V]	➢ Compare graphs in which different intervals or correspondences are used and explain why the interval or correspondence was used. ➢ Compare graphs in which the same data has been displayed using one-to-one and many-to-one correspondences and explain how they are the same and different. ➢ Describe why many-to-one correspondence is sometimes used rather than one to one correspondence. ➢ Find examples of graphs in which many-to-one correspondence is used in print and electronic media, such as newspapers, magazines and the Internet, and identify the correspondence used.
2. Construct and interpret pictographs and bar graphs involving many-to-one correspondence to draw conclusions. [C, PS, R, V]	➢ Identify the appropriate interval and correspondence for displaying a given set of data in a graph and justify the choice. ➢ Create and label (with axes, title, and legend) a pictograph to display a set of given data using many-to-one correspondence and justify the choice of correspondence used. ➢ Create and label (with axes, title, and legend) a bar graph to display a set of given data using many-to-one correspondence and justify the choice of interval used. ➢ Answer questions using a given graph in which data is displayed using many-to-one correspondence.

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Grade 5 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Represent and describe whole numbers to 1 000 000. [C, CN, V, T]	➢ Write numerals using proper spacing without commas, e.g., 934 567. ➢ Describe the patterns of adjacent place positions moving from right to left. ➢ Describe the meaning of each digit in a given numeral. ➢ Provide examples of large numbers used in print or electronic media. ➢ Express a given numeral in expanded notation, e.g., $45\,321 = (4 \times 10\,000) + (5 \times 1\,000) + (3 \times 100) + (2 \times 10) + (1 \times 1)$ or $40\,000 + 5\,000 + 300 + 20 + 1$. ➢ Write the numeral represented by a given expanded notation.
2. Apply mental mathematics strategies and number properties to determine answers for basic multiplication facts and related division facts (to 81) such as: • skip counting from a known fact • using doubling or halving • using patterns in the 9s facts • using repeated doubling. [C, CN, R, V]	➢ Describe the mental mathematics strategy used to determine a given basic fact, such as: • skip count up by one or two groups from a known fact, e.g., if $5 \times 7 = 35$, then 6×7 is equal to $35 + 7$ and 7×7 is equal to $35 + 7 + 7$ • skip count down by one or two groups from a known fact, e.g., if $8 \times 8 = 64$, then 7×8 is equal to $64 - 8$ and 6×8 is equal to $64 - 8 - 8$ • doubling, e.g., for 8×3 think $4 \times 3 = 12$, and $8 \times 3 = 12 + 12$ • patterns when multiplying by 9, e.g., for 9×6, think $10 \times 6 = 60$, and $60 - 6 = 54$; for 7×9, think $7 \times 10 = 70$, and $70 - 7 = 63$ • repeated doubling, e.g., if 2×6 is equal to 12, then 4×6 is equal to 24 and 8×6 is equal to 48. ➢ Explain why multiplying by zero produces a product of zero. ➢ Explain why division by zero, e.g., $8 \div 0$, is not possible or undefined. ➢ Recall multiplication and related division facts to 81.

Grade 5 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
3. Apply mental mathematics strategies for multiplication, such as: • annexing zero • halving and doubling • using the distributive property. [C, R]	➢ Determine the answers when one factor is a multiple of 10, 100 or 1 000 by annexing zero or adding zeros, e.g., if $3 \times 2 = 6$, then $3 \times 20 = 60$ and $3 \times 200 = 600$. ➢ Apply halving and doubling when determining a given product, e.g., 32×5 is the same as 16×10. ➢ Apply the distributive property to determine a given product involving multiplying factors that are close to multiples of 10, e.g., $98 \times 7 = (100 \times 7) - (2 \times 7)$.
4. Demonstrate an understanding of multiplication (2-digit by 2-digit), to solve problems. [C, CN, PS, V]	➢ Use expanded notation for both factors to show the partial products, e.g., for 36×42, determine the partial products for $(30 + 6) \times (40 + 2)$. ➢ Use base ten blocks to model arrays that illustrate the steps in determining the product of two given 2-digit factors and record the process symbolically. ➢ Use a pictorial representation, such as an area model, to illustrate a solution procedure for determining the product of two given 2-digit factors. ➢ Use personal procedures to solve given multiplication problems in context.
5. Demonstrate, with and without concrete materials, an understanding of division (3-digit by 1-digit) and interpret remainders to solve problems. [C, CN, PS]	➢ Model the division process as equal sharing using base ten blocks and record it symbolically. ➢ Explain that the interpretation of a remainder depends on the context: • ignore the remainder, e.g., making teams of 4 from 22 people • round up the quotient, e.g., the number of five passenger cars required to transport 13 people • express remainders as fractions, e.g., five apples shared by two people • express remainders as decimals, e.g., measurement and money. ➢ Solve problems that involve division.

Grade 5 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
6. Use estimation strategies, including: • front-end rounding • compensation • compatible numbers in problem-solving contexts. [C, CN, ME, PS, R]	➢ Provide contexts for situations when estimation is used to: • make predictions • check reasonableness • find approximate answers. ➢ Describe contexts in which overestimating is important. ➢ Determine the approximate solution to a given problem not requiring an exact answer. ➢ Use compatible numbers to estimate a sum or product. ➢ Use compensation to estimate the solution to a given problem and explain the reason for compensation. ➢ Select and use an estimation strategy for a given problem. ➢ Apply front-end rounding to estimate: • sums, e.g., $253 + 615$ is more than $200 + 600 = 800$ • differences, e.g., $974 - 250$ is close to $900 - 200 = 700$ • products, e.g., the answer for 23×24 is greater than 20×20 (400) and less than 25×25 (625) • quotients, e.g., the answer for $831 \div 4$ is greater than $800 \div 4$ (200).
7. Demonstrate an understanding of fractions by using concrete and pictorial representations to: • create sets of equivalent fractions • compare fractions with like and unlike denominators. [C, CN, PS, R, V]	➢ Use concrete materials to create a set of equivalent fractions and explain why there are many equivalent fractions for any given fraction. ➢ Illustrate and explain that equivalent fractions represent the same quantity. ➢ Use concrete materials or pictorial representations to determine if two given fractions are equivalent. ➢ Generate a rule for creating a set of equivalent fractions. ➢ For a given fraction, name the equivalent fractions. ➢ Compare two given fractions with unlike denominators by creating equivalent fractions. ➢ Position a given set of fractions with like and unlike denominators on a number line and explain strategies used to determine order.

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Grade 5 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
8. Describe and represent decimals (tenths, hundredths and thousandths) concretely, pictorially and symbolically. [C, CN, R, V]	➢ Write the decimal for a given concrete or pictorial representation of part of a set, part of a region or part of a unit of measure. ➢ Use concrete materials or a pictorial representation to illustrate a given decimal. ➢ Use a grid to represent an equivalent tenth, hundredth or thousandth for a given decimal. ➢ Express a given tenth as an equivalent hundredth and thousandth. ➢ Express a given hundredth as an equivalent thousandth. ➢ Explain the value of each digit in a given decimal.
9. Express decimals as fractions (to thousandths). [CN, R, V]	➢ Write a given decimal in its fractional form. ➢ Write a given fraction with a denominator of 10, 100 or 1 000 as a decimal. ➢ Name a given pictorial or concrete representation of a decimal numeral as a fraction or decimal, e.g., 250 shaded squares on a thousandth grid can be named as 0.250 or $\frac{250}{1000}$.
10. Compare and order decimals (to thousandths), by using: • benchmarks • place value • equivalent decimals. [CN, R, V]	➢ Order a given set of decimals by placing them on a number line that contains benchmarks, 0.0, 0.5, 1.0. ➢ Order a given set of decimals including only tenths, only hundredths and only thousandths using place value. ➢ Order a given set of decimals including only hundredths using place value. ➢ Order a given set of decimals including only thousandths using place value. ➢ Explain what is the same and what is different about 0.2, 0.20 and 0.200. ➢ Order a given set of decimals including tenths, hundredths and thousandths using equivalent decimals.

Grade 5 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Determine the pattern rule to make predictions about subsequent elements. [C, CN, PS, R, V]	➢ Extend a given pattern with and without concrete materials, and explain how each element differs from the proceeding one. ➢ Describe a given pattern using mathematical language and/or expressions, such as $n + 1$, $n - 1$, $n + 5$. ➢ Determine and explain why a given number is or is not the next element in a pattern. ➢ Determine and explain why a given number is an element of a pattern. ➢ Predict subsequent elements in a given pattern. ➢ Solve problems by using a pattern rule to determine subsequent elements. ➢ Represent a pattern visually to verify predictions.

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Grade 5 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
2. Solve problems involving single-variable, one-step equations with whole number coefficients and whole number solutions. [C, CN, PS, R]	➢ Translate a given word problem into an equation where the unknown is represented by a letter variable. ➢ Solve given single-variable equations where letter variables are used to represent different parts of the equation. ➢ Create a story problem for a given equation.

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Grade 5 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Design and construct different rectangles given one or both of perimeter and area (whole numbers), and draw conclusions. [C, CN, PS, R, V]	➢ Construct or draw two or more rectangles for a given perimeter in a problem-solving context. ➢ Construct or draw two or more rectangles for a given area in a problem-solving context. ➢ Construct or draw two or more rectangles for a given area and perimeter in a problem-solving context. ➢ Illustrate that for any given perimeter, the square or shape closest to a square will result in the greatest area. ➢ Illustrate that for any given perimeter, the rectangle with the smallest possible width will result in the least area. ➢ Provide a real-life context for when it is important to consider the relationship between area and perimeter.
2. Demonstrate an understanding of measuring length (mm) by: • selecting and justifying referents for the units mm • modelling and describing the relationship between the units mm and cm and between the units mm and m. [C, CN, ME, PS, R, V]	➢ Provide a referent for one millimetre and explain the choice. ➢ Provide a referent for one centimetre and explain the choice. ➢ Provide a referent for one metre and explain the choice. ➢ Use concrete materials, e.g., ruler, to show that 10 millimetres is equivalent to 1 centimetre. ➢ Use concrete materials, e.g., metre stick, to show that 1 000 millimetres is equivalent to 1 metre. ➢ Provide examples of when millimetres are used as the unit of measure.

Grade 5 **Strand:** Shape and Space (Measurement) (continued)	**General Outcome:** Use direct or indirect measurement to solve problems.
3. Demonstrate an understanding of volume by: • recognizing that volume is measured in cubic units • selecting and justifying referents for the units cm^3 or m^3 • estimating volume by using referents for cm^3 or m^3 • measuring and recording volume (cm^3 or m^3) • constructing rectangular prisms for a given volume. [C, CN, ME, PS, R, V]	➢ Describe volume as the amount of space inside a 3-D object, recorded in cubic units. ➢ Identify the cube as the most efficient unit for measuring volume and explain why. ➢ Provide a referent for a cubic centimetre and explain the choice. ➢ Provide a referent for a cubic metre and explain the choice. ➢ Determine which standard cubic unit is represented by a given referent. ➢ Use personal referents to estimate the volume of a given 3-D object. ➢ Determine the volume of a given 3-D object using manipulatives and explain the strategy. ➢ Construct a rectangular prism for a given volume. ➢ Demonstrate that many rectangular prisms are possible for a given volume by constructing more than one rectangular prism for the same given volume.
4. Demonstrate an understanding of capacity by: • recognizing that the litre is the standard unit for measuring capacity • describing the relationship between mL and L • selecting and justifying referents for the units mL or L • estimating capacity by using referents for mL or L • measuring and recording capacity (mL or L). [C, CN, ME, PS, R, V]	➢ Describe capacity as the amount a container can hold. ➢ Identify the litre as the standard unit for measuring capacity. ➢ Demonstrate that 1 000 millilitres is equivalent to 1 litre by filling a 1 litre container using a combination of smaller containers. ➢ Provide a referent for a litre and explain the choice. ➢ Provide a referent for a millilitre and explain the choice. ➢ Determine which capacity unit is represented by a given referent. ➢ Use personal referents to estimate the capacity of a given container. ➢ Determine the capacity of a given container using manipulatives and explain the strategy.

Grade 5 **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
5. Describe and provide examples of edges and faces of 3-D objects, and sides of 2-D shapes that are: • parallel • intersecting • perpendicular • vertical • horizontal. [C, CN, R, T, V]	➢ Identify parallel, intersecting, perpendicular, vertical and horizontal edges and faces on 3-D objects. ➢ Identify parallel, intersecting, perpendicular, vertical and horizontal sides on 2-D shapes. ➢ Provide examples in the environment that are parallel, intersecting, perpendicular, vertical and horizontal. ➢ Find examples of edges, faces and sides that are parallel, intersecting, perpendicular, vertical and horizontal in print and electronic media, such as newspapers, magazines and the Internet. ➢ Draw 2-D shapes or 3-D objects that have edges, faces and sides that are parallel, intersecting, perpendicular, vertical or horizontal. ➢ Describe the faces and edges of a given 3-D object using such terms as parallel, intersecting, perpendicular, vertical or horizontal. ➢ Describe the sides of a given 2-D shape using such terms as parallel, intersecting, perpendicular, vertical or horizontal.
6. Identify and sort quadrilaterals including: • rectangles • squares • trapezoids • parallelograms • rhombuses according to their attributes. [C, R, V]	➢ Identify and describe the characteristics of a pre-sorted set of quadrilaterals. ➢ Sort a given set of quadrilaterals according to their attributes. ➢ Sort a given set of quadrilaterals according to the measures of the lengths of the sides. ➢ Sort a given set of quadrilaterals according to whether or not opposite sides are parallel.

Grade 5 **Strand:** Shape and Space (Transformations)	**General Outcome:** Describe and analyze position and motion.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
7. Identify and describe a single transformation including a translation, a rotation and a reflection of 2-D shapes. [C, T, V]	➢ Provide examples of translations, rotations and reflections, e.g., flagpole, wheel, mirror. ➢ Identify a given single transformation as a translation, rotation or reflection. ➢ Demonstrate that a 2-D shape and its transformation image are congruent (same size and shape). ➢ Describe the direction and magnitude of a given transformation. ➢ Identify the line of reflection between a given 2-D shape and its reflection image. ➢ Demonstrate that any point in a reflection image is equidistant from the reflection line as its corresponding point on the original 2-D shape. ➢ Describe a given rotation by: • the direction of the turn, clockwise or counter clockwise • the fraction of the turn, $\left(\frac{1}{4}, \frac{1}{2}, \frac{3}{4}\right)$; • the point of rotation, centre or on the perimeter of the original 2-D shape. ➢ Illustrate that a 2-D shape and its transformation image are congruent.

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Grade 5 **Strand:** Shape and Space (Transformations) (continued)	**General Outcome:** Describe and analyze position and motion.
8. Perform a single transformation of a 2-D shape, with and without technology, and draw and describe the image. [C, CN, T, V]	➢ Translate a given 2-D shape horizontally, vertically or diagonally, and describe the position and orientation of the image. ➢ Rotate a given 2-D shape about a point, and describe the position and orientation of the image. ➢ Reflect a given 2-D shape in a line of reflection, and describe the position and orientation of the image. ➢ Perform a transformation of a given 2-D shape by following instructions for the transformation. ➢ Create a 2-D shape, translate the shape, and record the translation by describing the direction and magnitude of the movement. ➢ Create a 2-D shape, rotate the shape, and describe the direction of the turn, clockwise or counter clockwise, the fraction of the turn and point of rotation. ➢ Create a 2-D shape, reflect the shape, and identify the line of reflection and the distance of the image from the line of reflection. ➢ Predict the result of a single transformation of a 2-D shape and verify the prediction.

Grade 5 **Strand:** Statistics and Probability (Data Analysis)	**General Outcome:** Collect, display and analyze data to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Differentiate between first-hand and second-hand data. [C, R, V]	➢ Explain the difference between first-hand and second-hand data. ➢ Formulate a question that can best be answered using first-hand data and explain why. ➢ Formulate a question that can best be answered using second-hand data and explain why. ➢ Find examples of second-hand data in print and electronic media, such as newspapers, magazines and the Internet.
2. Construct and interpret double bar graphs to draw conclusions. [C, PS, R, T, V]	➢ Determine the common attributes (title, axes, intervals and legend) of double bar graphs by comparing a given set of single and double bar graphs. ➢ Create a double bar graph from a given set of data, label the title and axes, and create a legend. ➢ Draw conclusions from a given double bar graph to answer questions. ➢ Solve a given problem by constructing and interpreting a double bar graph. ➢ Provide examples of double bar graphs used in a variety of print and electronic media, such as newspapers, magazines and the Internet.

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Grade 5 **Strand:** Statistics and Probability (Chance and Uncertainty)	**General Outcome:** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
3. Describe the likelihood of a single outcome occurring using words such as: • impossible • possible • certain. [C, CN, PS, R]	➢ Provide examples of events that are impossible, possible or certain from personal contexts. ➢ Identify the likelihood of a single outcome occurring in a probability experiment as impossible, possible or certain. ➢ Design and conduct a probability experiment in which the likelihood of a single outcome occurring is impossible, possible or certain.
4. Compare the likelihood of two possible outcomes occurring using words such as: • less likely • equally likely • more likely [C, CN, PS, R]	➢ Identify outcomes from a given probability experiment which are less likely, equally likely or more likely to occur than other outcomes. ➢ Design and conduct a probability experiment in which the likelihood of one outcome is less likely to occur than the other. ➢ Design and conduct a probability experiment in which the likelihood of one outcome is equally likely to occur than the other. ➢ Design and conduct a probability experiment in which the likelihood of one outcome is more likely to occur than the other.
5. Demonstrate that different outcomes may occur when repeating the same probability experiment. [PS, T]	➢ Conduct a given probability experiment a number of times, record the outcomes and explain the results.

Grade: 6 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of place value for numbers: • larger than one million • smaller than one thousandth. [C, CN, R, T]	➢ Explain how the pattern of a place value system, e.g., the repetition of ones, tens and hundreds, makes it possible to red and write numerals of any magnitude. ➢ Provide examples of where large numerals and small decimals are used, e.g., media, science, medicine and technology.
2. Solve problems involving large numbers using technology. [PS, T]	➢ Identify which operation is necessary to solve a given problem and solve it. ➢ Determine the reasonableness of an answer.
3. Demonstrate an understanding of factors and multiples by: • determining multiples and factors of numbers less than 100 • identifying prime and composite numerals • solving problems involving multiples. [PS, R, V]	➢ Identify the multiples for a given numeral and explain the strategy used to identify the multiple. ➢ Determine all the whole number factors of a given numeral using arrays. ➢ Identify the factors for a given numeral and explain the strategy, e.g., concrete or visual representations, repeated division by prime numbers or factor trees. ➢ Provide an example of a prime number and explain. ➢ Provide an example of a composite number and explain. ➢ Sort a given set of numerals into prime and composite. ➢ Solve a given problem involving multiples.
4. Relate improper fractions to mixed numbers. [CN, R, V]	➢ Use models to show that a given improper fraction represents a number more than 1. ➢ Express improper fractions as mixed numbers. ➢ Express mixed numbers as improper fractions. ➢ Position a given set of fractions, including mixed numerals and improper fractions, on a number line and explain strategies used to determine position.

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Grade: 6 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
5. Demonstrate an understanding of ratio concretely, pictorially and symbolically. [C, CN, R, V]	➢ Explain that ratio is a comparison of two like quantities. ➢ Provide a concrete or pictorial representation for a given ratio. ➢ Write a ratio from a given concrete or pictorial representation. ➢ Explain a given ratio in multiple forms, such as 3:5, $\frac{3}{5}$, 3 per 5 or 3 to 5. ➢ Identify and describe ratios from real-life examples and record them symbolically. ➢ Explain the part/whole and part/part ratios of a set, e.g., for a group of 3 girls and 5 boys, explain the ratios 3:5, 3:8 and 5:8. ➢ Solve given problems involving ratio.
6. Demonstrate an understanding of percent concretely, pictorially and symbolically. [C, CN, R]	➢ Explain that "per cent" means "out of 100." ➢ Explain that percent is a ratio out of 100. ➢ Use concrete materials and pictorial representation to illustrate a given percent. ➢ Record the percent displayed in a given concrete or pictorial representation. ➢ Express a given percent as a fraction and decimal. ➢ Identify and describe percents from real-life examples and record them symbolically. ➢ Solve given problems involving percents.
7. Demonstrate an understanding of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]	➢ Extend counting numbers to less than zero on a number line and explain the pattern on each side of zero. ➢ Place integers on a number line and explain how integers are ordered. ➢ Describe contexts in which integers are used, e.g., on a thermometer. ➢ Use concrete materials and diagrams to represent positive and negative integers. ➢ Compare two integers, represent their relationship using the symbols <, > and =, and verify using a number line. ➢ Arrange given integers in ascending or descending order.

Grade: 6 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
8. Demonstrate an understanding of addition and subtraction of decimals (limited to thousandths). [C, CN, PS, R, V]	➢ Use front-end estimation to place the decimal in a sum or difference, e.g., for 6.3 + 0.25 + 306.158, think 6 + 306, so the sum is greater than 312. ➢ Without using paper and pencil, correct errors of decimal point placements in sums and differences. ➢ Explain why keeping track of place value positions is important when adding and subtracting decimals. ➢ Use estimation strategies to predict sums and differences of decimals. ➢ Solve problems that involve addition and subtraction of decimals, limited to thousandths.
9. Demonstrate an understanding of multiplication and division of decimals (1-digit whole number multipliers and divisors). [C, CN, PS, R, V]	➢ Use front-end estimation to place the decimal in a product, ➢ e.g., for 15.205 m × 4, think 15 m × 4, so the product is greater than 60 m. ➢ Use front-end estimation to place the decimal in a quotient, ➢ e.g., for \$26.83 ÷ 6, think \$24 ÷ 4, so the product is greater than \$6. ➢ Without using paper and pencil, correct errors of decimal point placements in products and quotients. ➢ Use estimation strategies to predict products and quotients of decimals. ➢ Solve problems that involve multiplication and division of decimals (1-digit whole number multipliers and divisors).
10. Illustrate and explain the order of operations, excluding exponents, with and without technology (limited to whole numbers). [CN, ME, PS, T]	➢ Explain, and demonstrate with examples, why there is a need to have a universally accepted order of operations. ➢ Apply the order of operations to solve multi-step problems, with or without technology, e.g., computer or calculator.

Grade: 6 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of the relationship within T-tables to solve problems. [C, CN, PS, R]	➢ Generate one column of a T-table when given the other column and a pattern rule. ➢ State, using mathematical language, the relationship of a given completed T-table. ➢ Construct a concrete or pictorial representation of the relationship shown in a T-table. ➢ Predict the value of an unknown term using the relationship in a T-table and verify the prediction. ➢ Formulate a one-step rule to describe the relationship between two columns of numbers in a T-table. ➢ Identify missing elements in a given table. ➢ Identify errors in a given table. ➢ Describe the pattern within each column of a given T-table. ➢ Develop a T-table to record and reveal a pattern to solve a given problem.
2. Represent and describe patterns and relationships using graphs and tables. [C, CN, ME, PS, R, V]	➢ Translate a pattern to a table of values and graph the table of values (limit to linear graphs with discrete elements). ➢ Translate a pattern shown on a graph into a table of values. ➢ Summarize, orally or in writing, the relationship shown on a graph using everyday language in spoken or written form.

Grade: 6 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
3. Demonstrate and explain the meaning of preservation of equality concretely, and record the process. [C, CN, PS, R, V]	➢ Model the preservation of equality for addition using concrete materials and record the process. ➢ Model the preservation of equality for subtraction using concrete materials and orally explain the process. ➢ Model the preservation of equality for multiplication using concrete materials and orally explain the process. ➢ Model the preservation of equality for division using concrete materials and orally explain the process. ➢ Record the process used to preserve equality.
4. Solve problems involving single-variable, one-step equations with whole number coefficients and whole number solutions. [C, CN, PS, R]	➢ Represent a given equation on a balance, apply the preservation of equality to solve one-step equations and explain the process. ➢ Represent a given one-step equation pictorially or symbolically, apply the preservation of equality to solve the equation and explain the process. ➢ Explain and illustrate strategies for solving single variable one-step equations.

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Grade 6 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of angles by: • identifying examples of angles in the environment • classifying angles according to their measure • estimating the measure of angles using 45°, 90° and 180° as reference angles • determining angle measures in degrees • drawing and labelling angles when the measure is specified. [C, CN, V]	➢ Provide examples of angles found in the environment. ➢ Classify a given set of angles according to their measure, i.e., acute, right, obtuse, straight and reflex. ➢ Sketch, without the use of a protractor, 45°, 90° and 180° angles and describe the relationship among them. ➢ Estimate the measure of an angle using the reference angles of 45°, 90° and 180°. ➢ Measure a given angle in various orientations using a protractor. ➢ Draw and label a specified angle in various orientations using a protractor.
2. Describe the measure of angles as: • the measure of a rotation • the measure of an inside corner of a polygon. [C, PS, R]	➢ Provide examples of the measure of angles that represent the measure of rotation. ➢ Provide examples of the measure of rotation that represent the measure of angles. ➢ Provide examples of the measure of angles that represent the measure of an inside corner of a polygon. ➢ Provide examples of the measure of an inside corner of a polygon that represent the measure of angles.
3. Demonstrate that the sum of interior angles is: • 180° in a triangle • 360° in a quadrilateral. [C, R]	➢ Construct models to confirm the measure of the interior angles of a triangle is 180°. ➢ Construct models to confirm the measure of the interior angles of a quadrilateral is 360°.

Grade 6 **Strand:** Shape and Space (Measurement) (continued)	**General Outcome:** Use direct or indirect measurement to solve problems.
4. Develop and apply a formula for determining the: • perimeter of polygons • area of rectangles • volume of right rectangular prisms. [C, CN, PS, R, V]	➢ Explain that the perimeter of any polygon is equal to the sum of the lengths of its sides. ➢ Generalize a rule to create a formula for determining the perimeter of polygons including rectangles and squares. ➢ Explain that the area of any rectangle can be determined by multiplying the measure of its length by the measure of its width. ➢ Generalize a rule to create a formula for determining the area of rectangles. ➢ Explain that the volume of any right rectangular prism can be determined by multiplying the area of its base by its height. ➢ Generalize a rule to create a formula for determining the volume of right rectangular prisms. ➢ Solve problems involving the perimeter of polygons, the area of rectangles and the volume of right rectangular prisms.

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Grade: 6 **Strand:** Shape and Space (3-D Objects and 2-D Shapes)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
5. Construct, compare and name triangles including: • scalene • isosceles • equilateral • right • obtuse • acute in different orientations. [C, PS, R, V]	➢ Classify a given set of triangles according to the lengths of the sides. ➢ Classify a given set of triangles according to the measures of the interior angles. ➢ Identify the characteristics of a given triangle to classify the triangle according to its sides and angles. ➢ Sort a given set of triangles and explain the sorting rule. ➢ Construct an example of a specified triangle, e.g., scalene, isosceles, equilateral, right, obtuse, acute. ➢ Replicate a given triangle in a different orientation and show that the two are congruent.
6. Describe and compare the sides and angles of regular and irregular polygons. [C, PS, R, V]	➢ Sort a given set of 2-D shapes into polygons and non-polygons and explain the sorting rule. ➢ Demonstrate congruence of the sides to sides and angles to angles in a regular polygon through superimposing. ➢ Demonstrate congruence of the sides to sides and angles to angles in a regular polygon through measuring. ➢ Sort a given set of polygons as regular or irregular and justify. ➢ Identify and describe regular and irregular polygons in the environment.

Grade 6 **Strand:** Shape and Space (Transformations)	**General Outcome:** Describe and analyze position and motion.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
7. Create a combination of translation(s) rotation(s) and/or reflection(s) of a single 2-D shape, with and without technology, and draw and describe the image. [C, CN, PS, T, V]	➢ Demonstrate that a 2-D shape and its transformation image are congruent (same size and shape). ➢ Model a given series of translations, a series of rotations or a series of reflections of a 2-D shape. ➢ Model a given combination of two unlike transformations of a 2-D shape. ➢ Draw and describe a 2-D shape and its image given a combination of like or unlike transformations. ➢ Describe the transformations performed on a 2-D shape to produce a given image. ➢ Model a given combined series of translation(s), rotation(s) and/or reflection(s) of a 2-D shape. ➢ Create and record one or more series of transformations of a 2-D shape that will result in a given image.
8. Create designs resulting from a combination of transformations of 2-D shapes and identify the transformations used. [C, CN, T, V]	➢ Analyze a given design created by transforming one 2-D shape, identify the original shape and the transformations used to create the design. ➢ Create a design using one 2-D shape and describe the transformations used to create it.

Grade 6 **Strand:** Shape and Space (Transformations) (continued)	**General Outcome:** Describe and analyze position and motion.
9. Identify and plot points in the first quadrant of a Cartesian plane using whole number ordered pairs. [C, CN, V]	➢ Label the axes of the first quadrant of a Cartesian plane and identify the origin. ➢ Identify the location of a point in the first quadrant of a Cartesian plane using ordered pairs. ➢ Plot points in the first quadrant of a Cartesian plane with intervals of 1, 2, 5 or 10 on its axes, given whole number ordered pairs. ➢ Draw designs using given ordered pairs in the first quadrant of a Cartesian plane. ➢ Determine the distance between points along horizontal and vertical lines in the first quadrant of a Cartesian plane. ➢ Create a design in the first quadrant of a Cartesian plane and identify the points used to produce the design.
10. Perform a single transformation of a 2-D shape in the first quadrant of a Cartesian plane. [CN, PS, T, V]	➢ Identify the coordinates of the vertices of a given 2-D shape in the first quadrant of a Cartesian plane. ➢ Identify the coordinates of the vertices of the image of a 2-D shape in the first quadrant of a Cartesian plan after a transformation. ➢ Describe the positional change of the vertices of a 2-D shape and its image.

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Grade 6 **Strand:** Statistics and Probability (Data Analysis)	**General Outcome:** Collect, display and analyze data to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Construct, label and interpret line graphs to draw conclusions. [C, CN, PS, R, V]	➢ Determine the common attributes (title, axes and intervals) of line graphs by comparing a given set of line graphs. ➢ Determine whether a given set of data can be represented by a line graph (continuous data) or a series of points (discrete data) and explain why. ➢ Construct a line graph from a given table of values. ➢ Interpret a given line graph to draw conclusions.
2. Select, justify and use appropriate methods of collecting data, including: • questionnaires • experiments • databases • electronic media. [C, PS, T]	➢ Select a method of collecting data to answer a given question and justify the choice. ➢ Design and administer a questionnaire for collecting data to answer a given question and record the results. ➢ Answer a given question by performing an experiment, recording the results and drawing a conclusion. ➢ Explain when it is appropriate to use a database as a source of data. ➢ Use electronic media to gather data for a given question, including selecting data from data bases.
3. Graph collected data and analyze the graph to solve problems. [C, CN, PS]	➢ Determine an appropriate type of graph for displaying a set of collected data and justify the choice of graph. ➢ Solve problems by graphing data and interpreting the resulting graph.

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Grade 6 **Strand:** Statistics and Probability (Chance and Uncertainty)	**General Outcome:** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
4. Demonstrate an understanding of probability by: • identifying all possible outcomes of a probability experiment • differentiating between experimental and theoretical probability • determining the theoretical probability of outcomes in a probability experiment • determining the experimental probability of outcomes in a probability experiment • comparing experimental results with the theoretical probability for an experiment. [C, ME, PS, T]	➢ List the possible outcomes of a probability experiment, such as: • tossing a coin • rolling a die with a given number of sides • spinning a spinner with a given number of sectors. ➢ Describe theoretical probability as the ratio of the number of favourable outcomes to the number of possible outcomes and provide examples. ➢ Describe experimental probability as the ratio of observed favourable outcomes to the number of trials within a probability experiment. ➢ Determine the theoretical probability of an outcome occurring for a given probability experiment. ➢ Use theoretical probability to predict the probability of a given outcome occurring for a given probability experiment. ➢ Conduct a probability experiment, with and without technology, and compare the experimental results to the theoretical probability. ➢ Explain that as the number of trials in a probability experiment increases, experimental probability approaches theoretical probability.

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Grade 7 **Strand:** Number	**General Outcome:** Develop number sense.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10 and why a number cannot be divided by 0. [C, R]	➢ Determine if a given number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10 and explain why. ➢ Sort a given set of numbers based upon their divisibility using organizers such as Venn and Carroll diagrams. ➢ Determine the factors of a given number using the divisibility rules. ➢ Explain, using examples, why numbers cannot be divided by 0.
2. Demonstrate an understanding of the addition, subtraction, multiplication and division of decimals (for more than 1-digit divisors or multipliers, the use of technology is expected) to solve problems. [ME, PS, T]	➢ Solve a given problem involving the addition of two or more decimal numbers. ➢ Solve a given problem involving the subtraction of decimal numbers. ➢ Solve a given problem involving the multiplication of decimal numbers. ➢ Solve a given problem involving the multiplication or division of decimal numbers with a 1-digit multiplier or divisor, without the use of technology. ➢ Solve a given problem involving the multiplication or division of decimal numbers with more than a 1-digit multiplier or divisor, with the use of technology. ➢ Use front-end estimation to place the decimal in a sum or difference, e.g., for 4.5 + 0.73 + 256.458, think 4 + 256, so the sum is greater than 260. ➢ Use front-end estimation to place the decimal in a product, ➢ e.g., for 12.332 m × 14, think 12 m × 12, so the product is greater than 144 m). ➢ Use front-end estimation to place the decimal in a quotient, ➢ e.g., for \$51.50 ÷ 11, think \$55 ÷ 11, so the product is less than \$5. ➢ Use estimation to check the reasonableness of solutions. ➢ Solve problems that involve operations on decimals, limited to thousandths, taking into consideration the order of operations.

Grade 7 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
3. Solve problems involving percent. [C, CN, PS, R, T]	➢ Represent a given percent as a decimal or fraction. ➢ Solve a given problem that involves finding a percent. ➢ Determine the answer to a given percentage problem where the answer requires rounding and explain why an approximate answer is needed, e.g., total cost including taxes.
4. Demonstrate an understanding of the relationship between repeating decimals and fractions, and terminating decimals and fractions. [C, CN, R, T]	➢ Predict the decimal representation of a given fraction using patterns (e.g., $\frac{1}{11} = 0.09\overline{09}\ldots$, $\frac{2}{11} = 0.18\overline{18}$, $\frac{3}{11} = ?\ldots$). ➢ Match a given set of fractions to their decimal representations. ➢ Sort a given set of fractions as repeating or terminating decimals. ➢ Represent a given fraction as a terminating or repeating decimal. ➢ Represent a given repeating decimal as a fraction. ➢ Represent a given terminating decimal as a fraction. ➢ Provide examples where the decimal representation of a fraction is an approximation of the exact value.
5. Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely and symbolically. [C, CN, ME, PS, R, V]	➢ Model addition and subtraction of positive fractions and mixed numbers using concrete representations, and record symbolically. ➢ Determine the sum of two given fractions with like denominators. ➢ Determine the difference of two given fractions with like denominators. ➢ Determine a common denominator for a given set of fractions. ➢ Determine the sum of two given fractions with unlike denominators. ➢ Determine the difference of two given fractions with unlike denominators. ➢ Simplify a given fraction by identifying the common factor between the numerator and denominator. ➢ Simplify the solution to a given problem involving the sum or difference of two fractions. ➢ Solve given problems involving the addition or subtraction of positive fractions and determine if the solution is reasonable.

Grade 7 **Strand:** Number (continued)	**General Outcome:** Develop number sense.
6. Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]	➢ Explain, using concrete materials and diagrams, that the sum of opposite integers is zero. ➢ Use a number line to illustrate the results of adding or subtracting negative and positive integers, e.g., a move in one direction followed by an equivalent move in the opposite direction results in no net change in position. ➢ Add two given integers using concrete materials or pictorial representations and record the process symbolically. ➢ Subtract two given integers using concrete materials or pictorial representations and record the process symbolically. ➢ Solve given problems involving the addition and subtraction of integers.

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Grade: 7 **Strand:** Patterns and Relations (Patterns)	**General Outcome:** Use patterns to describe the world and solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Translate between an oral or written pattern and an equivalent algebraic expression (one-step, first-degree). [C, CN, R]	➢ Determine an algebraic expression to represent the relationship in a given oral or written pattern. ➢ Create a table of values from a given algebraic expression by substituting values for the variable. ➢ Provide a context for a given algebraic expression that represents a pattern. ➢ Use an algebraic expression to represent a pattern in the environment.
2. Graph algebraic expressions, analyze the graph and draw conclusions from a pattern to solve problems. [C, CN, R, V]	➢ Translate an algebraic expression to a table of values and graph the table of values, e.g., limit to linear graphs with discrete elements. ➢ Graph a given algebraic expression and describe the patterns found in the graph to draw conclusions. ➢ Describe the relationship shown on a graph, using everyday language in spoken or written form to solve problems.

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Grade: 7 **Strand:** Patterns and Relations (Variables and Equations)	**General Outcome:** Represent algebraic expressions in multiple ways.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
3. Explain the difference between a mathematical expression and an equation. [CN, PS, V]	➢ Identify and provide examples of constant terms, numerical coefficients and variables in expressions and equations. ➢ Explain what a variable is and how it is used in a given mathematical expression. ➢ Provide an example of an expression and an equation, and explain how they are similar and different.
4. Evaluate an expression given the value of the variable(s). [CN, R]	➢ Substitute the values for an unknown in an expression and evaluate.
5. Model and solve problems that can be represented by one-step linear equations of the form $x + a = b$, concretely, pictorially and symbolically, where a and b are integers. [CN, PS, R, V]	➢ Represent a problem with a mathematical equation and solve using concrete models, e.g., counters, integer tiles. ➢ Draw a visual representation of the steps required to solve a given mathematical equation. ➢ Solve problems using equations. ➢ Verify the solution to an equation using concrete materials and diagrams. ➢ Substitute the solution for the variable into the original equation to verify the equality.
6. Model and solve problems that can be represented by linear equations of the form: • $ax + b = c$ • $ax = b$ • $\frac{x}{a} = b$ concretely, pictorially and symbolically, where a, b and c are positive integers. [CN, PS, R, V]	➢ Represent a problem with a mathematical equation and solve using concrete models, e.g., counters, balance, integer tiles. ➢ Draw a visual representation of the steps required to solve a given mathematical equation. ➢ Solve problems using equations. ➢ Verify the solution to an equation using concrete materials and diagrams. ➢ Substitute the solution for the variable into the original equation to verify the equality.

Grade 7 **Strand:** Shape and Space (Measurement)	**General Outcome:** Use direct or indirect measurement to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of circles by: • describing the relationships among radius, diameter and circumference of circles • relating circumference to pi • determining that the sum of the central angles of a circle is 360° • constructing circles with a given radius or diameter • solving problems involving the radii, diameters and circumferences of circles. [C, CN, R, V]	➢ Illustrate and explain that the diameter is twice the radius. ➢ Illustrate and explain that the circumference is approximately three times the diameter. ➢ Describe, that for all circles, pi is the ratio of the circumference to the diameter $\frac{C}{d}$ whose value is approximately 3.14. ➢ Illustrate and explain that the sum of the central angles of a circle is 360°. ➢ Draw a circle with a given radius or diameter with and without a compass. ➢ Solve contextual problems involving circles.
2. Develop and apply a formula for determining the area of a: • triangle • parallelogram • circle. [CN, PS, R, V]	➢ Illustrate and explain how the area of a rectangle can be used to determine the area of a triangle. ➢ Generalize a rule to create a formula for determining the area of a triangle. ➢ Illustrate and explain how the area of a rectangle can be used to determine the area of a parallelogram. ➢ Generalize a rule to create a formula for determining the area of parallelogram. ➢ Illustrate and explain how to determine the area of a circle without the use of the formula. ➢ Apply the formula for determining the area of a circle. ➢ Solve problems involving the area of triangles, parallelograms and circles.

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Grade 7 **Strand:** Shape and Space (3-D objects and 2-D shapes) (continued)	**General Outcome:** Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
3. Perform geometric constructions including: • perpendicular line segments • parallel line segments • perpendicular bisectors • angle bisectors to solve problems. [CN, PS, R, V]	➢ Describe and explain examples of geometric constructions in the environment. ➢ Identify line segments that are parallel or perpendicular on a given diagram. ➢ Draw a line segment perpendicular to another line segment and explain why they are perpendicular. ➢ Draw a line segment parallel to another line segment and explain why they are parallel. ➢ Construct the bisector of a given angle using more than one method and verify the resulting angles are equal. ➢ Construct the perpendicular bisector of a line segment using more than one method and verify. ➢ Solve problems that require the use of geometric constructions.

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Grade 7 **Strand:** Shape and Space (Transformations)	**General Outcome:** Describe and analyze position and motion.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
4. Identify and plot points in the four quadrants of a Cartesian plane using integral ordered pairs. [C, CN, V]	➢ Label the axes of a Cartesian plane and identify the origin. ➢ Identify the location of a point in any quadrant of a Cartesian plane using ordered pairs. ➢ Plot points in any quadrant of a Cartesian plane with intervals of 1, 2, 5 or 10 on its axes, given integral ordered pairs. ➢ Draw designs using given order pairs in a Cartesian plane. ➢ Create a design in any quadrant of a Cartesian plane and identify the points used to produce the design. ➢ Describe the image resulting from the transformation of a 2-D shape on a four quadrant Cartesian plane by identifying the coordinates of the vertices of the image.
5. Describe positional change of points using horizontal and vertical descriptors in relation to a reference point in a four quadrant Cartesian plane. [C, PS, V]	➢ Identify the coordinates of the vertices of a given 2-D shape on a four quadrant Cartesian plane. ➢ Describe the horizontal and vertical movement required to move from a given point to another. ➢ Describe the positional change of the vertices of a 2-D shape to the corresponding vertices of its image as a result of a transformation or series of transformations. ➢ Determine the distance between points along horizontal and vertical lines in a four quadrant Cartesian plane.

Grade 7 **Strand:** Statistics and Probability (Data Analysis)	**General Outcome:** Collect, display and analyze data to solve problems.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
1. Demonstrate an understanding of central tendency and range by: • determining the measures of central tendency (mean, median, mode) and range • determining the most appropriate measures of central tendency to report findings. [C, PS, R, T]	➢ Determine mean, median and mode for a given set of data, and explain why these values may be the same or different. ➢ Determine the range of given sets of data. ➢ Provide a context in which the mean, median or mode is the most appropriate measure of central tendency to use when reporting findings. ➢ Solve problems involving the measures of central tendency.
2. Determine the effect on the mean, median and mode when an outlier is included in a data set. [C, CN, PS, R]	➢ Analyze a set of data to identify any outliers. ➢ Explain the effect outliers have on the measures of central tendency for a given data set. ➢ Identify outliers in a set of data and justify whether or not they are to be included in the reporting of the measures of central tendency. ➢ Provide examples of situations in which outliers would and would not be used in reporting the measures of central tendency.
3. Construct, label and interpret circle graphs to solve problems. [C, CN, PS, R, T, V]	➢ Identify common attributes of circle graphs such as: • title, label or legend • the sum of the angles of the sectors is 360° • the data is reported as a percent of the total and the sum of the percents is equal to 100%. ➢ Create and label a circle graph to display a given set of data, with and without technology. ➢ Find and compare circle graphs in a variety of print and electronic media, such as newspapers, magazines and the Internet. ➢ Translate percentages displayed in a circle graph into quantities to solve problems. ➢ Interpret a given circle graph to answer questions.

Grade 7 **Strand:** Statistics and Probability (Chance and Uncertainty)	**General Outcome:** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.
Specific Outcomes *It is expected that students will:*	**Achievement Indicators** *The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*
4. Express probabilities as ratios, fractions and percents. [C, CN, R, V]	➢ Determine the probability of a given outcome occurring for a given probability experiment, and express it as a ratio, fraction and percent. ➢ Express the probability of an impossible event as 0 (0%) and the probability of an event that is certain as 1 (100%).
5. Identify the sample space for a probability experiment involving two independent events. [C, ME, PS]	➢ Provide examples of two independent events, such as: • tossing a coin and rolling a die • tossing two coins • rolling two dice and explain why they are independent. ➢ Identify the sample space (all possible outcomes) for each of two independent events, using tree diagrams, tables or other graphic organisers.
6. Conduct a probability experiment to compare the theoretical and experimental probability of two independent events. [C, PS, R, T]	➢ Determine the theoretical probability of an outcome involving two independent events. ➢ Use theoretical probability to predict the probability of a given outcome involving two independent events. ➢ Conduct a probability experiment involving two independent events, with and without technology, to compare the experimental results to the theoretical probability. ➢ Solve probability problems involving two independent events.

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APPENDIX 1: REFERENCES

American Association for the Advancement of Science [AAAS-Benchmarks]. *Benchmark for Science Literacy.* New York, NY: Oxford University Press, 1993.

ARMSTRONG, Thomas. *Seven Kinds of Smart: Identifying and Developing Your Many Intelligences.* New York, NY: NAL-Dutton, 1993.

BANKS, J.A. and Banks, C. A. M. *Multicultural Education: Issues and Perspectives.* Boston: Allyn and Bacon, 1993.

BRITISH COLUMBIA. Ministry of Education. *The Primary Program: A Framework for Teaching*, 2000.

CAINE, Renate Numella and Geoffrey Caine. *Making Connections: Teaching and the Human Brain.* Menlo Park, CA: Addison-Wesley Publishing Company, 1991.

CHARLES, Randall and Joanne Lobato. *Future Basics: Developing Numerical Power, a Monograph of The National Council of Supervisors of Mathematics.* Golden, CO: National Council of Supervisors of Mathematics, 1998.

DEL GRANDE, John. "Spatial Sense." *Arithmetic Teacher* 37 (6), 1990, p. 14-20.

FRAIVILLIG, J. "Strategies for Advancing Children's Mathematical Thinking." *Teaching Children Mathematics* 7 (8), 2001, p. 454-459.

GREENO, J. Number sense as a situated knowing in a conceptual domain. *Journal for Research in Mathematics Education* 22 (3), 1991, p. 170-218.

HOWDEN, H. Teaching Number Sense. *Arithmetic Teacher*, 36 (6), 1989, p. 6-11.

STEEN, Lynn Arthur (ed). *On the Shoulders of Giants, New Approaches to Numeracy.* Washington, DC: National Academy Press, 1990.

VAN DE WALLE, J. "Concepts of Number." In Payne, J.N., ed. *Mathematics for the Young Child.* Reston, VA: National Council of Teachers of Mathematics, 1990.

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